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ABSTRACT

Innovations in the training of community health personnel that emphasize the importance of the development of health personnel able and willing to serve the community by providing health care, promoting health, preventing disease, and caring for those in need are examined. The need for effective and efficient training programs relevant to present and future community requirements as well as to the characteristics of learners is discussed. Such programs seek to maximize the effectiveness of the teaching/learning process by basing it on community problems, by introducing the concepts of integration and active learning, and by using appropriate technology. A sample of 14 innovative programs from various countries are described including: The Institut Technologique de la Sante Publique, Constantine, Algeria; The University of Queensland, Brisbane, Australia; The Medical School of the University of Brasilia, Brazil; The McMaster Programme of Medical Education, Hamilton, Ontario, Canada; Fiji School of Medicine, Suva, Fiji; The Medical University of Pecs, Hungary; University Center for Health Science, Ben Gurion University of the Negev, Israel; The Rijksuniversiteit Limburg, Maastricht, Netherlands; Faculty of Medicine, Ramathibodi Hospital, Bangkok, Thailand; School of Medicine, Hacettepe Yaounde, United Republic of Cameroon; College of Human Medicine, Michigan State University; The Upper Peninsula Health Education Corporation, Marquette, Michigan; The WAMI Program, University of Washington School of Medicine, Seattle; Ecole Inter-Etats d'Ingenieurs d'Equipement Rural, Ouagadougou, Upper Volta. (SF)

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PERSONNEL FOR HEALTH CARE:

Case Studies of Educational Programmes

Edited by

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FOREWORD

The development of health personnel able and willing to serve the community by providing health care, promoting health, preventing disease and caring for those in need is a major and formidable task of educators. It is they who have the responsibility of ensuring that training programmes are relevant to present and future community requirements as well as to the characteristics of learners, and that the programmes are effective and efficient in maximizing the potential of each student to acquire the competencies and attitude needed to carry out his or her tasks as a member of a health team.

Unfortunately, too often there is still reliance on past educational experiences which were proved to be inefficient; as a result there are still too many educational programmes and processes which are irrelevant and inappropriate in a changing world and too few which apply the knowledge now available about effective teaching and learning.

But to offset this undesirable tendency there are some educators who are accepting the challenge, who are breaking with tradition in instituting educational programmes specifically oriented to community health needs. Such programmes seek to maximize the effectiveness of the teaching/learning process by basing it on community problems, by introducing the concepts of integration and active or experiential learning, and by using appropriate technology.

In the present volume some of these "innovations" are described by those responsible for, or participating in, programmes of this type. The accounts given of these educational experiences serve to demonstrate the efforts now being made to maximize efficiently and effectively the utilization of the scarcest of our resources—namely, properly trained manpower. (Descriptions of further examples of these programmes are expected to be published in the near future.)

Such descriptions are not meant to provide models but rather to exemplify some alternative strategies. It is hoped that they will stimulate discussion

and—most importantly—the continuous search for improvement. They are meant as illustrations of the steps taken on the long road leading to the integrated development of national health services and manpower, necessary to meet the health needs and demands of the entire population and ensure the achievement of the goal "health for all by the year 2000".

H. MAHLER
Director-General
World Health Organization

INTRODUCTION

This publication, presenting descriptions of 14 educational programmes for different categories of health personnel, forms part of the World Health Organization's programme for health manpower development, which has as its principal objectives:[1]

(*a*) To promote the development of appropriate health personnel to meet the needs of entire populations; and

(*b*) To promote the development and application of relevant processes for basic and continuing education.

One important activity in pursuance of these objectives is the "collection and analysis of the results of the manifold experiments launched in the past 20-25 years, *inter alia* in the field of multidisciplinary (integrated), community-oriented, multiprofessional (team) teaching and the use of professional schools for the training of all categories of health personnel ...".[2]

By inviting those responsible for developing some of these experiments to describe and comment critically on their programmes it is hoped to disseminate information about such programmes and also to indicate factors or conditions which have facilitated or inhibited their development.

The case descriptions are hence intended to provide information about activities carried out, be they in the planning or in the implementation phase, to provide an appropriate training programme for health workers. The studies are not intended to be evaluations of the effectiveness, efficiency or impact of the programmes, but rather accounts of activities, of difficulties encountered, or of what has been and is happening.

It is important also to stress that the programmes described here have not been selected nor should be identified as models of what ought to be. Rather, and the authors who have contributed will agree, they are examples of attempts to provide an education for future health workers

[1] WHO Official Records No. 233, 1976, Annex 7.

[2] *Health manpower development*, Geneva, World Health Organization, 1976, p. 28 (unpublished document A29/15 presented to the Twenty-ninth World Health Assembly).

which is oriented to meet the specific health needs of the people in different localities.

The programmes differ considerably in the degree to which they are innovative, that is, depart from traditional approaches; they differ in the strategies employed, their orientation, the educational processes used, the organizational structures developed, and in their relationship with the health services. Each of the programmes described, however, has at least attempted to introduce one or several modifications to what is commonly practised in educational institutions for health personnel.

The programmes are hence examples of alternative approaches used in response to some fundamental issues or problems which are of concern to all who accept the challenge of developing appropriate health manpower as a means for ensuring improved health care. Some of these problems are listed below, with examples of modifications described in the case descriptions.

How can an educational programme be effectively coordinated with the health service to ensure that it fulfils its proper functions in improving the health status of the community of which it is a part?

Several of the authors either directly or by implication address themselves to this problem and give accounts of strategies which seek to ensure that there is effective coordination.

In one programme, the medical school participates in the planning and implementation of all levels of health services for an entire region and hence achieves coordination both in the planning and in the implementation of health service manpower development. Because of the potential benefit of such a coordinating mechanism, it is not surprising to find in this programme precise definitions of roles and functions of future graduates and an involvement of students and teachers in a comprehensive health care system.

There are other examples of attempts to coordinate the educational programmes with the health service systems, and almost invariably the authors express concern about the difficulties encountered. There is reference to the difficult issue of managing the conflicting demands for structuring health care settings to provide service on the one hand, and to meet the needs of students on the other. This problem is well known in the case of teaching hospitals, but in many of the programmes described here the "service versus education" issue is raised in settings outside the hospital, such as community health care units. In developing countries, particularly, the need for care far exceeds capacity and this adds to the problem of using these settings for experiential learning. Yet, it is such learning experience which links education to the future responsibilities of trainees.

How can an educational programme ensure that it is oriented towards or is relevant to the health needs of the population?

The achievement of educational relevance is the underlying principle to which all the programmes are dedicated; it is the essential requirement of any health manpower development programme.

Partly, at least, this requirement can be met by the kind of coordination mechanism referred to above; however, to achieve relevance is no simple task. The educational planner must seek to make the training programme relevant to the functions to be performed by health personnel both as they exist, and as they are likely to be in the future. This means that information is needed on present and future requirements, on assessment of health needs, and on plans for the future.

The authors indicate some of the problems that arise in striving to find a proper balance between training for the present and for the future. They refer to a number of dilemmas commonly experienced; for instance, model health centres are built and used for training, yet the health system often has no place for personnel trained for these functions; the roles and tasks of future health workers can only be identified on the basis of adequate information about the present health status of the population, yet such information is often not available; coordinated planning requires that a country health plan exists, yet few countries have or are involved in preparing such plans.

Difficulties or problems encountered sometimes reflect characteristics of the educational institutions and the professions involved. For example, the traditionalism of educators, often supported by reference to some nebulous "professional standards" or the requirements of external accrediting bodies or examinations, are described as frustrating the achievement of the objective—namely, a relevant educational programme.

Many of the authors refer to their frustrations when the goal of relevance is obscured by intransigence on the part of educators or by conditions external to the educational programme, such as the health system. For those concerned with ensuring that programmes contribute to the health care of the people, there are useful lessons to be learned from the experiences described.

How can the content of an educational programme be identified, or what should the student be expected to learn?

The case descriptions provide varied and valuable examples of approaches used in defining what the student is expected to learn, or how the content of a curriculum is defined. The reader is invited to give careful attention to the process by which such decisions were made. For instance, in some cases these decisions derive from an analysis of activi-

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Case Studies of Educational Programmes

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ties to be carried out by the graduates (see above). By focusing on the functions expected of graduates, the relationship between students' education and their eventual work is likely to be enhanced. It is noteworthy that some authors refer to the difficulties encountered in using this approach, especially as it is often threatening to instructors (it is well known that some instructors take a pride in answering the question of what in their course is directly useful to the graduate with the response "nothing").

Commonly, decisions about what is taught are left to instructors and become a matter of collective staff opinion. In such cases, the past experiences of instructors and the examples of programmes elsewhere become the determining influences.

Several of the case descriptions highlight an important shift in what is considered to be the proper content of a curriculum. Facts, concepts and skills are not enough; the educational programme should also be oriented to foster the development of appropriate attitudes, values and problem-processing (commonly referred to as "problem-solving") skills. This orientation finds expression in the case descriptions in references to clinical problem-solving, commitment to human welfare, and the willingness to be self-critical about strengths and weaknesses.

The content of the curriculum, as described by several authors, also reflects a shift towards primary care and community medicine. This, in turn, has led to attention being given to the study of the social and behavioural sciences as a foundation for an approach to health care which is not solely curative and disease-oriented, but which accepts that medicine is a social science.

Another important consideration, reflected in the content as well as in the process of instruction, is the concern that health personnel should function as members of a health team. Given that effective health care requires the services of personnel with different competencies, it is essential that trainees should have appropriate experience of such cooperative endeavours, and have the ability to work towards a common goal, to communicate and to share responsibility.

Several of the case descriptions contain examples of efforts to accomplish more effective multiprofessional programmes providing experiences relevant to work in a health team. Thus, model health centres for the delivery of health care have been established and are used for training different categories of health personnel simultaneously. In other programmes, courses have been developed to be taken by students of different health professions. Other programmes have attempted to create organizational structures conducive to cooperation.

Here again, many difficulties have been encountered and are expressed by the authors. With some notable exceptions, it is possible to detect a

feeling of frustration at the apparent lack of success in multiprofessional education to date.

How can the process by which the student is helped to acquire the requisite abilities, including attitudes and values, be made optimally effective and efficient?

The case descriptions highlight several important principles which are increasingly guiding the development of the instructional process. The most important of these are: integration; sequencing; student-oriented rather than teacher-oriented instruction; experiential learning; and use of small groups as an instructional setting.

Since the term "integration" will be found in many of the programme descriptions and is often misunderstood, it may be useful to clarify its meaning. "Integration" is used in its educational context to describe a grouping of curricular content that cuts across traditional academic discipline boundaries such as the divisions between anatomy, biochemistry, pharmacology and psychology. It is also used to refer to linking clinical education with what is commonly termed "preclinical" studies (the biological, social, and physical sciences). In some instances, integration is even used to refer to courses offered to students of different professions (see above).

For the present purpose, the term will be used to denote any grouping of curricular content that cuts across traditional disciplines or specialty boundaries, both basic and clinical. The early introduction of clinical studies or the later study of basic sciences will be referred to as sequencing, while common instruction to students of different professions will be considered as multiprofessional instruction.

The concern with integration expressed by a number of contributors to this volume essentially derives from the recognized need for students to be able to apply, rather than simply to possess, knowledge. The findings of a large body of educational research on learning support the conclusion that students will be more likely to retain and use knowledge and skills if the application of this knowledge to real problems is recognized. Further, learning is facilitated if the way a student learns approximates to the way in which he or she will be expected to carry out professional tasks.

Integration is a way of organizing knowledge and skills to approximate to practice more closely than academic disciplines normally do.

Another rationale for integration, which is less acknowledged, is that a rearrangement of the content of the curriculum according to some cross-disciplinary theme quite often results in changing the content itself, new areas being added and others reduced. It is, hence, a means for stimulating constructive dialogues among instructors and for revising a curriculum.

The themes used as a basis for integration of curricular content are numerous. Two of the most popular, exemplified in several of the case descriptions, are organ systems, and health or clinical problems. The natural history of disease, growth, and development are other examples of integrating themes.

Sequencing is at last also receiving the attention of curriculum planners. This is most evident in the early introduction of field studies or clinical work, based on the principle that such experience will make the study of relevant theory meaningful and applicable. The case descriptions provide useful information, particularly in dealing with such questions as: when during an instructional programme will practical experiences be most profitable; and what are the necessary prerequisites for field experience?

Less attention has been given to the teaching of basic sciences in the later years of an educational programme, although there is mention of it in one or two of the studies. Apparently, the long-standing assumption that basic sciences are prerequisites, that there is some hierarchical conceptual arrangement, remains unchallenged. But, if it be conceded that the basics are important to effective practice, should they not be taught late in the curriculum as well as early?

Several of the authors specifically refer to the efforts made to change from a teacher-oriented to a student-oriented instructional process. The role of the student is no longer viewed as one of a passive recipient of information but rather as that of an active learner. This has resulted in a move away from the lecture—the information-giving setting *par excellence*—to instructional procedures which require the student to take responsibility for seeking and manipulating information. Increasing use is reported of self-instructional methods, of problem-solving in small groups, and of project work. In some instances, students are not given specific definitions stating how much they need to know about a topic, on the ground that being able to make these judgements is an important skill of a professional worker and should be learned.

Experiential learning, or on-the-job training, is also receiving increasing attention. Considerable emphasis is given in some of the programmes to placing students in settings which approximate to those of their future practice or which provide stimuli for problem identification. Carefully structured experiences of this type should be recognized as most valuable learning experiences.

The use of the small group as a learning setting is not only justified by research studies showing the benefit of group dynamics in assisting students to learn, but also because it provides an opportunity for learning the value and skills of interacting with colleagues.

Generally, all of the programmes describe improvements attempted in the teaching/learning process itself. There is evidence of experimentation in the utilization of alternative methods, appropriate to different abilities of students, subject matter and facilities available, for increasing effective and efficient learning.

How can student and teacher performance, as well as that of the programme as a whole, be evaluated and hence further the improvement of learning, of teaching and of the programme?

The importance of evaluation is increasingly recognized and many of the case descriptions devote considerable attention to an exposition of the evaluation process. Efforts have been made to relate what is expected of students or of learning objectives to what is evaluated. For example, if the objectives specify that the student should be able accurately to appraise his own educational strengths or weaknesses, or to establish a supportive relationship with a patient, then he should be assessed on these characteristics. Students quickly come to the conclusion that if something is not assessed it is not really viewed as important and hence does not require their attention. An effective evaluation process, by ensuring feedback to learners, is an essential requirement for efficient learning.

There are few explicit references to teacher evaluation in the case descriptions, although the need for it is either specifically mentioned or implicit in some comments of the authors.

In several of the studies, extensive attention is given to programme evaluation. This is an innovation in itself and has come about because those responsible for the programmes are aware of the need to ascertain the value of what they are doing. This reflects an interesting paradox; well-established programmes are usually assumed to be "good" until it is proved otherwise, whereas innovative programmes are assumed to be "poor" until it is proved otherwise.

A more important justification for effort expended in programme evaluation is that only by having appropriate information about the character and quality of a programme is it possible to make informed judgements leading to programme improvement.

How should students be selected to optimize the effectiveness of the learning opportunities provided and maximize the likely usefulness of the graduates in the provision of health care?

The case descriptions provide examples of alternative procedures and policies guiding the selection of students for admission to educational programmes.

The importance of appropriate selection derives from the knowledge that it is difficult to change adults by relatively short educational programmes. Hence, in order to optimize the likelihood that graduates of a programme will have the characteristics valued, it is necessary to select students with the potential for developing these characteristics. For instance, if the objectives include sensitivity to people, tolerance to ambiguity, and concern to assist the population most in need of health care, then it is appropriate for these to be used as criteria for selection.

It is noteworthy that in several of the programmes described there is less emphasis on academic achievement or on narrow indicators of intellectual ability, and a concomitant increase in the importance attached to affective, noncognitive indicators, than in more traditional programmes.

Unfortunately, the assessment of these potentials is difficult and, as yet, there is a dearth of research evidence or of measuring tools. Similarly, the prediction of which applicants will be more likely to practise in rural areas or to choose primary care rather than some specialty is hazardous and speculative at present.

What type of organizational structure is appropriate to the realization of institutional objectives which emphasize relevance, problem-oriented student learning and integration? In addition, which organizational structure provides the opportunity for members of the institution to participate in the decision-making process, and thus to feel encouraged to expend effort, and which organizational structure is most likely to produce a supportive climate for learning?

Most institutions engaged in training health personnel have a hierarchical organizational structure based on academic discipline departments. Communication between departments, between different levels within departments, and throughout the institution is usually minimal. Administrative decisions are passed down and there is little involvement by the teaching staff and none by the students in this process.

A theme of the case studies deals with the attempts to establish a management system and organization to conduct the programmes. It is apparent from the considerable discussion of this topic found in the studies that this is a particularly important matter. It will be noted that, in some instances, new educational approaches were implemented with little or no attention to the possible need for modification of existing management strategies. In other instances, alternative semi-autonomous organizational arrangements were set up by established schools. For new organizations there are examples of conscious efforts to mould the management structure in terms of the innovations to be tried and there

are examples of new schools adopting traditional structures without regard to the characteristics of the innovation. It is apparent that special attention should be given to such matters as: departmental as against interdepartmental organization; effects of instructional modalities (lecture, small group, self-instruction) on scheduling of faculty activity, course numbering, sequencing, etc.; changes in the responsibilities of instructors; the relationships between health care services and education; and the effect of geographic decentralization on communication patterns.

The discipline-based department, where staff have common theoretical concepts and experience, is perhaps a useful organization for specialized research and even specialized patient care. It does not facilitate—and in fact has proved to be a major hurdle to—integrated instruction. Several of the case descriptions provide examples of alternative structures specifically designed to overcome this constraint. The accounts of the authors stress the difficulties which arise in introducing such departures from the norm.

By changing the instructional process from a teacher-oriented to a learner-oriented procedure, a number of consequential changes are produced in the culture of an institution. Thus, the role of instructor and the reciprocal role of student necessarily alter, with the result that there are also different patterns of communication and decision-making processes.

Some authors make specific reference to these consequences of introducing a new type of educational process, commenting on the apparent involvement and enthusiasm of students which develop.

* * *

Responding to an invitation by WHO to describe these educational programmes, the authors have made a major contribution, not only by providing information about some important alternative approaches to the education of health personnel, but also by offering their own critical commentaries.

The case descriptions do not purport to be comprehensive assessments of educational programmes. They are personal interpretations closely associated with what occurred. They reflect the range of human emotion associated with trying to respond to societal need through educational change—elation, anxiety, frustration, distrust, threat, accomplishment, dedication, enthusiasm, uncertainty, arrogance, and humility. For the readers who may sense the need for educational changes in the setting of which they are a part, it is hoped that this volume will offer encouragement. The experience of others in what has been done and their identification of the factors which contribute to or inhibit success should

be helpful. For readers who are in the midst of trying something new, the authors' reflections may provide a better understanding of their situation. It is often helpful to discover that the problems one faces are not unique.

In varying degrees, each case study presents: (*a*) a socioeconomic description of the country or area in which the project was developed, emphasizing health conditions; (*b*) a description of the institution that conducted the programme; (*c*) details of the programme itself; (*d*) an assessment of the circumstances leading to the introduction of the innovation; (*e*) a review of the programme; and (*f*) some personal observations. In no sense are the cases to be considered as solutions that are being promoted for adoption elsewhere. On the contrary, the focus is deliberately placed on the interrelationship between the nature of the problem, the characteristics of the setting, and the strategy developed for educational intervention.

WHO hopes that it will be possible, in the near future, to publish information about similar endeavours in other settings, including the results of systematic evaluations of educational programmes as these become available.

The aim of the present volume, and of any future documentation on the subject, is to further the resolve of those who are concerned to change that which ought to be changed while preserving that which ought to be preserved. The publication of the case studies herein thus constitutes an endeavour to support all who are attempting or intending to develop new programmes. These innovators need help in overcoming the problem so well described by Machiavelli in 1513 in *The Prince:*

> "There is nothing more difficult to carry out nor more doubtful of success nor more dangerous to handle than to initiate a new order of things, for the reformer has enemies in all who profit by the old order and only lukewarm defenders in all those who would profit by the new order. This lukewarmness arises partly from fear of their adversaries who have the law in their favour and partly from the incredulity of mankind who do not truly believe in anything new until they have had actual experience with it."

CHAPTER 1

THE INSTITUT TECHNOLOGIQUE DE LA SANTÉ PUBLIQUE, CONSTANTINE, ALGERIA:

PREPARING HEALTH PERSONNEL FOR ALGERIA

COMITÉ PÉDAGOGIQUE

Institut technologique de Santé publique, Constantine, Algeria

In collaboration with World Health Organization consultants and advisers

EDITORIAL NOTE

Faced with an acute shortage of health personnel, Algeria developed institutes of technology charged with the development of different categories of health manpower other than physicians. The following description is an example of an educational programme planned and implemented in coordination with health planners and geared to meet local requirements.

In the educational programme at the Institut technologique de la Santé publique at Constantine, emphasis is on health team training and on helping to improve communications and cooperation among the various social, economic, political, educational and health agencies influencing development. One quite common barrier to health team training is mentioned. This barrier is the existence of separate administrative structures for the training programmes of each type of professional health worker. In Constantine, it took two years to develop cooperation between the medical assistant and the physician training programmes.

Basic science subjects are taught in a more integrated way to reduce duplication in the presentation of basic concepts. The educational programme emphasizes field work for students.

Central to the educational development strategy were the design and implementation of model health centres where the health team functioned in a manner modelling the way in which graduates of the Institute were expected to perform their duties. A model was designed for the delivery of integrated health services in these centres. One hundred and fifty activities were defined and grouped according to seven professional categories. The result is a list of the major tasks to be performed by each type of professional worker, which can also be used as a blueprint for the educational programme.

Some difficulties were experienced by the Institute. It was not easy, for example, to convince faculty staff and practitioners to teach and behave in ways consistent with the model of health centre function.

The Institut technologique de la Santé publique of Constantine is one of three institutes for health manpower training, the other two being in Algiers and Ouahran. They are among the numerous institutes of technology (at present around 40) which exist to train the different types of personnel necessary for the development of the country. These institutes are closely linked to national development plans and the political and economic orientation of Algeria.

During the years following independence, it became apparent that the existing training and educational establishments could not remedy the shortage of personnel and, moreover, that those trained personnel in the field were not able to meet the country's socioeconomic needs.

HEALTH MANPOWER

From 1962, independence year, to the start of the First Four-Year Plan in 1970, changes began to occur in the organization and functioning of professional health workers in Algeria. In 1962, the vacuum left by the mass departure of European medical and other health personnel

created a state of emergency and financial assistance was requested from friendly countries. In April 1963, there were only 297 *techniciens sanitaires*, a ratio of 1:26 700 inhabitants. There were, in addition, 193 Algerian doctors available, a ratio of 1:44 000 inhabitants.

Mobile health and sanitation teams were established at the health department level of each *Wilaya* (formerly "*préfecture de province*"), headed by a physician or a *technicien sanitaire*. These mobile teams conducted vaccination campaigns, worked to control epidemics, provided health education and administered emergency care to those accidentally injured through the explosion of mines or other war materials left lying about. Since 1963, energies have been devoted to identifying problems and setting priorities. Existing training establishments were restructured and reinforced and new ones created. As a result of this effort, by 1967, 480 *techniciens sanitaires* and other types of health personnel had graduated from the 21 schools then open in the country.

In spite of these achievements, there was still a serious shortage of health personnel in Algeria. The country had demonstrated its ability to respond to the immediate postwar crisis; it then became necessary to find educational methods that would result in more professional health workers of higher quality.

Political implications

New programmes for health professional manpower training were to be consistent with the health policy of the country, in that they were, in general, to deal with environmental problems, health education, and hygiene. At the same time, the health system had to be revised in order to enable trained personnel to meet the needs and the political orientation of the country. The general report of the First Four-Year Plan (1970-1973) stated that "action in the field of public health must satisfy both a profoundly felt social need and the necessity of preserving the human potential whose physical aptitudes condition economic development", and that "only institutes of technology can fulfil the need of the country for trained personnel".

The need for middle and higher categories of health personnel was so great, and traditional education processes took so long, that new approaches had to be found in order to meet the developmental objectives of the plan.

The institutes of technology were established as the means for training a sufficient number of personnel capable of immediately meeting national needs. Modern teaching techniques were to be used to create educational programmes of high quality. Emphasis was to be placed on short and intensive training cycles.

Graduates of the institutes would, in turn, be instrumental in:

(*a*) Providing preventive health services for most of the population;

(*b*) Providing free health care for the entire country, but especially in underserved rural areas;

(*c*) Facilitating integrated social development through provision of efficient and comprehensive health services; and

(*d*) Evolving a system of health professional education that would continuously adapt and readapt to changing national conditions.

In summary, the creation of the institutes of technology was a way of training Algerian youth to meet the socioeconomic needs of the country.

Objectives of the institutes

The Instituts technologiques de la Santé publique are the main basis for the health development of Algeria. All three of them train all categories of health personnel except physicians, i.e., medical assistants, public health midwives, male nurses, social workers, sanitary technicians, laboratory technicians, auxiliary anaesthetists, auxiliary dispensers, and radiology technicians.

Apart from the mass training of health personnel, the objectives of the Instituts technologiques de la Santé publique are:

(*a*) To train staff, taking into account the needs expressed by consumers and health authorities, so that they can start work as soon as possible;

(*b*) To set up a teaching plan, taking as a starting point the description of jobs for which students will be trained, and to apply modern educational science techniques to train students efficiently; and

(*c*) In general, to provide technical training to a large portion of the youth by avoiding the restrictive selection criterion of a secondary-school diploma.

The Instituts technologiques de la Santé publique help to assimilate into functional roles in society young people who cannot go to university but who display all the motivation necessary to undertake a health career. Using a modern teaching approach, based on the active participation and involvement of the student, the Instituts technologiques de la Santé publique aim to give these young people a chance to fulfil their potential and to serve their country.

ACTIVITIES OF THE INSTITUT TECHNOLOGIQUE DE LA SANTÉ PUBLIQUE AT CONSTANTINE

Since the aim of the Constantine Institute was to train different professional categories to implement the health policy of the country, it was

important to establish certain principles on which to base the training. There were three basic concepts: the health team; relating education to the health care system; and the multidisciplinary approach.

During the first five years of its existence, the Institute sought to develop appropriate methods and techniques supportive of these three principles. No easy answers were found.

The health team

Educational programmes were to be conducted in ways that would promote the ability of graduates to function effectively as members of health teams. This meant helping students to acquire respect for other team members, while still maintaining confidence in their own professional identities.

The importance of setting up a dialogue between the teachers of the different professional categories was not immediately apparent. For example, it took two years for the Institute, which was in charge of training medical assistants, to realize the importance of correlating its activities with those of the medical school at Constantine (Institut des Sciences médicales), which was responsible for training physicians. The fact that the Institute and the medical school were under two separate administrations did not facilitate contacts. To promote a real team spirit among competent and complementary staff and to enhance the value of the role of each member of the team, the following measures were taken:

(*a*) Improvement in the planning of the educational programme, taking into account the future responsibility of each individual member of the team in solving health problems;

(*b*) Replacement of the unsatisfactory word "auxiliary" by the more acceptable title *technicien de santé*; and

(*c*) Reduction of the salary differences between categories of health personnel by increasing the salaries of lower-paid categories.

In brief, it was necessary, from the psychological point of view, to give a new image to each health team member; from the operational point of view it was necessary to find ways of making use of all their capabilities; and from the educational point of view it was necessary to strengthen coordination between the different programmes in order to prepare the trainees for efficient teamwork.

Relating education to the health care system

The original plan of the Ministry of Public Health was to train two professional categories only: medical assistants and public health

midwives. The comprehensive nature of the health plan (preventive, curative, educational, promotional, and rehabilitative), however, necessitated the training of other categories as well.

The orientation of the Institute was clear: to respond to the country's needs by working to implement its health policy. The training process had to be structured in terms of the actual sickness and discomfort of the population as seen by health service personnel, and active collaboration with the health administration (especially the district health authorities) was essential if human and other resources were to be effective in improving the health of the public. An organic link between the teachers and health administrators had to be created as soon as possible.

Multidisciplinary approach

The staff to be trained were to be deeply involved in the socioeconomic progress of the country; the Institute therefore had to forge links between the different sectors concerned with the social and health development of the population.

There is fruitful collaboration with the university groups (the medical school and the Institute of Social and Economic Sciences) through teacher exchange and the sharing of the same facilities for training practice. Cooperation with the social services, political groups and municipal administrations allows the Institute, through its management, its teachers and its students, to contribute to such national goals as agricultural reform and the literacy campaign.

The Institute was obligated to break out of the isolation of the health sector, to combine with other sectors concerned in national socioeconomic development, and to disseminate to the rural and urban population certain measures of health action hitherto practised only by a privileged class.

Functional model of an integrated health centre

Although the Institute was intended to train personnel for broad preventive and curative action and for work in community health, no particular provision was made for training outside the hospital. It was agreed that the work would be done essentially in peripheral structures—health centres and dispensaries—and that the training would cover the traditional full array of health services: patient consultation, maternal and child health, prevention of disease (both infectious and noninfectious), vaccinations, laboratory tests, health education, epidemiological surveys, sanitation, mass campaigns, school hygiene, occupational health, etc.

How were these activities to be regulated? How was work to be divided among the staff members of an integrated health centre? How were these

activities to be programmed? As students reached the final year of their course, the Institute was faced with the necessity of setting up residency training (a training period during which the students reside for several months in a health district). It then became apparent that the health district administration was unable to offer the range of activities taught at the Institute and that, apart from certain mass campaigns and a few general directions for the control of tuberculosis, malaria, trachoma and notifiable diseases, community activities were seldom taken into account.

In conformity with the directives of the Ministry of Public Health and, consequently, with the agreement and cooperation of the health administrators, health training centres capable of dealing with all public health activities were developed. In order for these centres to work properly, it was necessary to create and test a functional model for an integrated health centre.

This model postulated a system for implementing integrated team care within a health centre, where "integrated service" was defined as harmonization of activities so that health objectives could be more easily reached. In the model, the team was divided into two sub-teams: the "inside" team working at the health centre; and the "outside" team mobile in the territory served by the centre. Work was divided on a more functional pattern than that of the division between preventive and curative care, which, apart from being artificial, could have damaged the spirit of integration.

In all the health districts to which students were sent for residency training, the administrators initially agreed to permit the trainees to organize their work according to the model proposed by the Institute. Later, they pilot-tested the integrated team model in selected health centres and allocated resources (materials, equipment, transport, and staff) to them. Finally, the model was adopted for all health centres of their districts.

Within three years, about ten health districts housed students. Each health district looks after the needs of 75 000–100 000 inhabitants and comprises a hospital with 40–100 beds and five or six health centres.

Medical students who joined the Institute students for training in public health also adopted this model, which became a common denominator for all professional categories during field training. Periodic evaluation meetings attended by teachers, staff and administrators were set up to ensure a correct understanding and implementation of the model in the districts. Moreover, a supervisory team from the Institute monitored the functioning of the delivery system, as well as the activities of trainees, on a weekly basis. Weekly conferences were held at the health district headquarters for trainees, local staff and an Institute representative to

evaluate the week's work and list activities for the following week. At the same time, the extent to which activities were consistent with the specifications of the plan was analysed.

Training of the type described above occurs in a small number of health centres because only a few local districts have been receptive to the integrated model. An important issue is whether staff trained in these centres can function effectively in health centres that are not part of the training system. To judge from experience so far, it seems that the integrated system meets the needs for peripheral services. It is hoped that when a national strategy is finally adopted it will be based on the model designed by the Institute; the graduates would then be well trained for the delivery system. At present, however, graduates of the Institute must act as pioneers and promote, to the best of their ability, the organization of health districts corresponding to the integrated team approach to community health that they learned in their training. These students are prepared both technically and psychologically to assume such responsibilities. The Institute contacts them periodically, and, when the opportunity arises, arranges group meetings, to remind them of their role. Although the integrated health centre is the ideal structure for the health team to dispense complete health services to the population, hospital work and work in centres geared to community problems are also being studied, as graduates of the Institute should be able to cope with a variety of situations.

Matrix of health team responsibilities

The steps associated with developing the integrated model for the delivery of community health care involved assessing the needs of the population, defining ways of meeting these needs, and identifying the responsibilities of the health team as a whole as well as the responsibilities of each of the team members.

A list of 150 activities was prepared, characterizing the functions of an integrated health centre. These 150 activities were grouped into seven different professional categories, corresponding to members of the health team. The seven professional categories at the Institute were: physician, medical assistant, public health midwife, nurse, social worker, and sanitary and laboratory technicians. For each action to be performed by a particular team member, the exact level of competence was specified. Five levels of action were defined: conception, planning, programming, implementation, and evaluation.

As a point of departure, the documents requesting United Nations assistance by the Algerian Government were consulted for job profiles of medical assistants and public health midwives. These job descriptions

served as temporary substitutes for the more complete descriptions derived from the matrix, since the most pressing task was to begin the educational programme. This necessitated some postponement of the integrated team design.

The matrix was developed three years after the initiation of the educational programme and two years later was put into use. This two-year time lapse between completion of the module and its implementation was the period necessary to convince teachers of the validity of the matrix and to complete its details. The validity of the module was established by two processes: group consensus and team consensus. To obtain group consensus the matrix was examined by seven professional commissions, one for each of the professions included in the team, to establish the level of responsibility for their respective professions in terms of the 150 activities. A team consensus was then achieved by requesting representatives of the seven commissions to review the work of their respective commissions from the point of view of the functioning of the team. In this way, individual professional perspectives as well as team perspectives were incorporated into the final design.

The resulting plan was used as a basis for planning health personnel training because it corresponded to the organization of services desired by administrators and users, taking into consideration the participation of a team in the realization of common objectives. The plan also represented the opinions of the health teaching staff.

It had originally been intended that each of the seven professional review teams should be composed of both teachers and practitioners but this was not accomplished. The matrix is to be viewed as dynamic; it was based on experience and can be revised and improved upon. In the future, other professional categories might be added to the health team, thus bringing about a redistribution of responsibilities. The entire model-building exercise brought educators together and encouraged reforms in teaching.

Educational planning

Viewed from an educational planning perspective, the matrix provides seven job descriptions, one for each member of the team, and indicates the ways in which the jobs are interrelated. Educational aims can be derived from these job descriptions rather than from the intuitive perspectives of instructors.

The curriculum as it now stands requires three years for most professional categories, and combines theory and practice. The curriculum for the third year is derived from the job description; the second-year curriculum is derived from that of the third year; and the first-year

curriculum, similarly, is derived from that of the second year. This approach to curriculum design resulted in an educational programme with a minimum level of fundamental sciences, integration of hitherto separate teaching, immediate and continuous involvement of the students in field work, and the creation of multiprofessional teaching modules.

Originally, fundamental sciences were included in the programme without strict justification in terms of their contribution to training personnel better equipped to meet the needs of the population. Certain subjects, such as enzymology and virology, were subsequently eliminated, while others, such as physiopathology and histopathology, were reduced in coverage. These changes in the amount of instruction in certain basic science subjects were very controversial; yet choices had to be made. For example, it is debatable whether a knowledge of the ultramicroscopic structure of the morbillous virus contributes to helping the medical assistant to reduce child mortality due to measles. Within a short educational cycle such as that provided by the Institute a judicious choice of subject matter had to be made. At the same time, other fundamental subjects, such as sociology, demography, psychology and anthropology, were emphasized because of their usefulness to graduates. These new subjects provide community concepts and orientation for future graduates in accordance with the plan's instructions to the institutes of technology.

Integrated teaching

Redundancy in the curriculum was avoided by integrating the teaching across subject areas, thereby reducing the number of teaching hours. This integration also helps to present students with situations closer to the multifaceted aspects of reality.

Immediate and continuous involvement in field work

After the first month at the Institute, students begin a cycle of field training which illustrates the social sciences and introduces them to public health courses. These activities are followed by discussions and reports, making students aware of national realities and allowing them to become better judges of the adequacy of their training to respond to future expectations. In the second and third years, the students are gradually exposed to more elaborate practical training in which they accept more responsibility in an integrated health centre until, at graduation, they are able to function in the job expected of them.

Creation of multiprofessional modules

The curriculum is organized functionally rather than by traditional subjects, resulting in a better combination of theory and practice.

Examples of the functional topic areas are public health administration and integrated pathology. Each unit area applies to many professional categories, and the development of the health team is emphasized.

Within each area of the teaching programme, instructors were encouraged to define objectives, to select teaching methods on the basis of these objectives, and to conduct objective assessment. Rarely have all three activities been carried out in a given subject area. Teachers tend to concentrate on one or other but not on all three. Educational technology is also used sporadically and tends to be selected on the basis of its convenience.

In the area of evaluation some teachers use multiple-choice tests to evaluate student performance, but these multiple-choice tests seldom measure students' achievement of educational goals. Evaluation, on the whole, remains haphazard.

It is expected that, with time and commitment to constant improvement, there will be a more extensive application of the principles of educational planning.

DEVELOPMENT OF THE INSTITUTE

The programme evaluation review technique (PERT) was applied to control the development of the Institute. After the setting of a final objective to be reached by a certain date (exactly at the end of the five years of WHO assistance) and starting from this general objective, a series of 44 objectives were spread out in time and related to each other by a network of activities. These 44 activities encompassed all the important points for the development of the Institute: updating of job profiles for a health team adapted to the country's needs; linking teachers and users of health manpower planning of theoretical and practical teaching; elaboration of teaching techniques; publication of basic documents; training of teaching staff; development of an audiovisual department; holding of meetings and seminars; and establishment of closer contacts between the Institute and the medical school, etc.

All personnel participated in this programmed development. Some even underlined, in their annual plan of activities, the correlation between their individual activities and those prescribed by the PERT plan.

Every three months, monitoring sessions examined the evolution of the Institute to see whether the objectives had been reached during the intended period. Readjustments were made for each delay or failure to reach an objective.

The application of PERT helped to make good use of human, technical and material resources, in addition to pointing out weaknesses. Those

weaknesses included slowness in training national staff for the management and teaching of students. In order to remedy this delay, which hinders the development of the Institute, a course on continuing education has been devised which is open not only to teaching staff of the Institute but also to any university or health administration staff. This course takes the form of weekly lecture-debates on the key themes of public health organization and the psychology of education.

During and at the end of the year, a general evaluation session of the residency training in public health and of field personnel is held in order to improve the training of students and the attainment of objectives. The health administration's analysis of the students' performance in residency training influences the programme of the Institute.

Three years' experience with the six-month practical training programme in about ten health districts has shown that students of the Institute can contribute actively to the implementation of health policy in the field. The directors of health centres, who meet at the Institute for lectures and seminars, agree that the Institute health teams have achieved positive results in dealing with community problems by applying tested public health methods and techniques. The performance of graduates in the health sector remains to be evaluated.

On the whole, for the reasons mentioned above, graduates of the Institute do not immediately find working conditions similar to those they encountered during training, as some of their superiors (health sector or hospital directors) continue to implement traditional approaches.

Answers to a questionnaire addressed to public health midwifery graduates from the Institute showed that, a year after leaving the Institute, 90% of them were not performing the tasks for which they had been trained and which they wished to perform. Most of them were exclusively assigned to the maternity ward, though work involving the delivery room and family protection would have been much more adapted to their competence and, evidently, to the needs of the population. Many graduates write to the Institute during the year following their graduation requesting support in adapting to their new responsibilities.

The Institute organizes seminars and meetings during which health administrators, graduates from the Institute and their senior colleagues debate topical questions. One of these seminars dealt with the place of the health team in the health sector and brought together 200 people, including well-known public health representatives, for three days of lectures, debates, and workshops. The Minister of Health attended the meeting to emphasize the importance of relating education to the health needs of the country. Thanks to this meeting and to others like it, the orientation of training at the Institute was seen to match that of the health policy of Algeria.

CHAPTER 2

THE UNIVERSITY OF QUEENSLAND, BRISBANE, AUSTRALIA:

DENTISTS IN TRAINING

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EDITORIAL NOTE

The case study of the dental school at the University of Queensland presents a prespective on attempts at curricular change in a long-established institution. It draws attention to the importance of dentists as members of the health care team and the use of elective courses to increase curricular flexibility.

The Faculty of Dentistry at the University of Queenland was founded in 1936 and is one of five Australian dental schools, the most recent one being established is 1946. The inpetus for changing the dental education programme at Queensland arose from a decision by the University in 1971 to change all of its teaching schedules from academic years to semesters. This made it mandatory for the dental school to revise its curriculum.

A series of attempts were made to bring about modifications in the curriculum. In 1974, a semester-unit course was started with a central core of prescribed subjects (approximately 80%) and the balance as electives. Adding elective courses to the curriculum required either reducing other courses or extending the time for the total programme. The Faculty of Dentistry chose to reduce other courses, although electives are concentrated in the first and last years.

Many of the barriers of conservatism that hinder efforts at educational change in established institutions are mentioned. Examples are: university scheduling requirements; the reluctance of the teaching staff to reduce their contact time with students or change their approach; the configuration of physical facilities; and departmental courses that are offered to students of several professional programmes, reducing the flexibility to respond to changes in one programme.

The Faculty of Dentistry sought to revise its curriculum in order to improve its capacity to meet individual student needs and interests, offer opportunities for a broader general education, and make the clinical experiences more patient-centred. The accomplishment of these objectives will require considerably more than the addition of elective courses.

There are five dental schools in Australia, each being part of a major university: Adelaide (1918), Melbourne (1904), Queensland (1936), Sydney (1901), and Western Australia (1946), the dates in parentheses being the years in which the universities accepted responsibility for undergraduate dental training. Students undertake a course of approximately five years and graduate with either a Bachelor of Dental Surgery degree (Adelaide, Sydney) of a Bachelor of Dental Science degree (Melbourne, Queensland, and Western Australia). A dental graduate from any of these schools can register as a dentist in any Australian state without further examination. Since all Australian degrees are recognized by the General Dental Council of the United Kingdom, there is a similar arrangement for registration in most countries that have reciprocity with the General Dental Council.

Most of the dental students in Australian universities enter the dental faculty directly from secondary schools without any other university (or other tertiary) study and consequently graduate at approximately 22 years of age.

DENTISTS AND DENTAL TRAINING

In December 1974, there were 5615 dentists listed on dental registers in Australia, giving a dentist to population ratio of 1:2375, though the active dentist to population ratio was 1:2817.[1] Table 1 summarizes the distribution of registered dentists throughout Australia and the contribution that the five dental schools have made towards the maintenance of this ratio. Table 2 is a more detailed analysis of the type of employment undertaken by the registered dentists.

The Australian Universities' Commission concluded in its Sixth Report (1975) that the present rate of graduation from Australian dental schools would lead to a shortage of about 1250 dentists in Australia by the early 1990s. Accordingly, it recommended in the same report that, from 1981, there ought to be an increase in the output of dental graduates from Australian universities by at least 100 and preferably by more than 150 per annum.

Until 1973, all universities in Australia (except Australian National University, Canberra) were created and regulated by Acts of the appropriate state governments and were financed from state resources, student fees and Federal Government subsidies. In December 1973, the Federal Government legislated (Act No. 176) to make university education free and, while each university still operated under a state act, the financing of university activities became almost totally dependent on the Federal Government. Furthermore, the Australian Universities' Commission can now exert a much greater influence on all university matters, for example, in encouraging or discouraging new developments and modifying the number of admissions. While most dental schools for years have had some form of restriction on enrolment because of the limits imposed by available clinical facilities, the introduction of quotas on initial entry into all faculties, including dentistry, has followed closely upon universal free education, as demand now exceeds resources.

Another change which has taken place in every state in the past few years and which will have considerable impact on dental education and manpower in Australia in the future is the introduction of training schools for dental therapists and their integration into school dental services. In Western Australia, therapists trained at the Western Australian Institute of Technology can elect to work for a dentist in a private practice rather than in a government dental service. The first school opened in Tasmania in 1966 and there are now schools in every state. Forty-seven therapists graduated in Australia in 1974, approximately 130 in 1975,

[1] *Future demand for dentists in Australia: a survey of the supply of and future requirements for dentists* (prepared by the Universities' Commission in collaboration with the Australian Department of Health and the Australian Bureau of Statistics), Canberra, Australian Government Publishing Service, 1975.

TABLE 1. NUMBER OF DENTISTS AND DENTAL GRADUATES IN AUSTRALIA, DECEMBER 1974

State	Name of university dental school	Dentists on registers of Australian dental boards			Dental graduates from Australian dental schools in 1974	
		Number	Percentage of total	Dentist to population ratio	Number	Percentage of total
New South Wales	Sydney	2114	37.6	1:2873	84	40.4
Victoria	Melbourne	1321	23.5	1:3027	39	18.8
Queensland	Queensland	857	15.3	1:2642	30	14.4
South Australia	Adelaide	521	9.3	1:2633	39	18.8
Western Australia	Western Australia	510	9.1	1:2402	16	7.6
Tasmania	—	112	2.0	1:4009	—	—
Northern Territory	—	61	1.1	1:5627	—	—
Australian Capital Territory	—	119	2.1	1:1767	—	—
Total	—	5615	100.0	1:2817	—	100.0

Source: See footnote 1, page 33.

TABLE 2. TYPE OF EMPLOYMENT OF DENTISTS REGISTERED ON AUSTRALIAN DENTAL BOARDS

State	Total registered	Type of employment									
		Own private practice		Employed in private practice		Government dental service		Overseas or interstate		Miscellaneous, e.g., university, armed forces, retired	
		No.	%	No.	%	No.	%	No.	%	No.	%
New South Wales	2114	1273	60.2	103	4.9	126	6.0	227	10.7	385	18.2
Victoria	1321	885	67.0	204	15.4	74	5.6	66	5.0	92	7.0
Queensland	857	461	53.8	60	7.0	164	19.1	63	7.4	109	12.7
South Australia	521	332	63.7	52	10.0	43	9.2	32	6.1	57	11.0
Western Australia	510	328	64.3	16	3.1	70	13.7	31	6.1	65	12.8
Tasmania	112	52	46.4	3	2.7	38	33.9	5	4.5	14	12.5
Northern Territory	61	2	3.3	0	0	16	26.2	42	68.9	1	1.6
Australian Capital Territory	119	64	53.8	8	6.7	22	18.5	15	12.6	10	8.4
Total	5615	3397	60.5	446	8.0	558	9.9	481	86.0	733	13.0

Source: See footnote 1, page 33.

and close to 200 in 1976; the number of these graduates will continue to increase.

THE UNIVERSITY OF QUEENSLAND FACULTY OF DENTISTRY

The University of Queensland has had a Faculty of Dentistry for a little over forty years, the first graduates receiving their Bachelor of Dental Science degrees in February 1936. Until 1962, the course was of four years' duration, the final year extending over a full calendar year. In 1946, the University had its Bachelor of Dental Science (B. D. Sc.) degree recognized by the General Medical Council of the United Kingdom, and Queensland graduates could then enjoy the international reciprocal arrangements for registration which existed between countries whose dental boards used the recommendations of the General Medical Council as guidelines for dental training. Despite the very large clinical component in the long final year, the four-year B. D. Sc. course in Queensland still did not comply with one important specification in the recommendations of the General Medical Council: namely, that "The period of clinical studies shall be at least two and a half years and shall not be deemed to begin until students have satisfied the examiners in anatomy, physiology, histology and biochemistry".

Concern was expressed about this situation by the newly constituted General Dental Council in the United Kingdom after an examiner had visited the Australian dental schools with four-year dental courses in 1957, although the training in general was praised. The alternatives which the University of Queensland then considered were: (*a*) to raise the standard of entry in science subjects in order that exemptions might be granted and space created in the first year for some of the second-year subjects, or (*b*) to extend the course to five years. The second alternative was chosen and, in 1962, new students in Queensland were enrolled in a revised Bachelor of Dental Science degree course of five years, within the normal three-term University academic calendar. No major alteration to course content was introduced at the time of these changes of timetable although, over the years, a number of evolutionary remodelling changes had also occurred within the curriculum. These evolutionary changes were mainly an increased emphasis on basic sciences and on preventive and community dentistry, and a decreased emphasis on some aspects of clinical dentistry, for example, exodontia and prosthetic dentistry. Most of these changes had not been peculiar to Queensland; they had been in step with the slowly changing scene elsewhere in the world.

In 1968, a committee was established within the Faculty of Dentistry. Its terms of reference were to obtain the views of a representative sample

of the profession on the structure of the Bachelor of Dental Science course, to collate the views obtained, to make recommendations on the future structure of the course, and to investigate the practicability of implementing any changes that were proposed. Comments and submissions were obtained from dental practitioners, academic staff, graduates of 1966, 1967 and 1968 and current students.

At that time (1968), two-thirds of the registered dentists in Queensland were self-employed in private practice and the remaining third were salaried, employed mostly within the Dental Service of the Queensland Health Department, the armed forces, the University or by private practitioners. An entirely different, almost reverse, trend was shown in the immediate destination of the graduates of 1966, 1967 and 1968: none was self-employed in private practice, 47% were in the Health Department, 20% were in the armed forces and 13% were overseas, mostly in England. Not surprisingly, the committee found itself with differing views on the priorities that should exist in a dental curriculum. Discussions continued during 1969 and 1970 and, although agreement was reached on the general objectives, no agreement was reached on any revision of the curriculum either in principle or in implementation.

This very time-consuming exercise highlighted the great difficulties in changing an existing curriculum, rigidly filled with subjects indicated to be compulsory. The final approved list of objectives, produced by the committee, provided material for the Faculty Handbook but in itself offered no specific recommendations or encouragement for effective progressive reform. The objectives stated that the undergraduate curriculum should: "Provide students with the knowledge, skills, and attitudes that they require to become competent practitioners of dentistry; ensure that students have a thorough understanding of scientific method and its application to the assessment, evaluation and solution of dental problems; and encourage students to recognize the limitations of their knowledge and to continue their education throughout their professional life".

An assessment of the failure to revise the curriculum between 1968 and 1971 would suggest that, despite acceptance of the need for revision and reform, there was resistance to its implementation on any piecemeal basis. Adding to one subject meant taking from another. The sad fate of consolidation seemed inevitable.

ELECTIVE COURSES IN DENTAL EDUCATION

In 1971, some general major changes occurred within the University of Queensland, which provided the opportunity to redesign the whole dental curriculum. It was decided that, from the beginning of 1974, there would be an academic year of two semesters rather than of three terms. All

faculty boards were asked to consider the effect that this would have on their curricula, and individual departments were asked to propose courses that they would like to offer over a semester of fourteen weeks. There was an overriding provision that all proposals had to be capable of implementation within existing resources.

In 1972, the Board of the Faculty of Dentistry appointed a Curriculum Committee to consider and recommend the changes that should occur in the undergraduate dental curriculum. Merely to divide the existing five-year course into one of ten semesters would have been minimally disruptive but such an approach would have negated one of the major advantages of changing over to a two-semester year in a university, i.e., flexibility in the design of courses. The Committee set about investigating designs which would permit flexibility in at least two ways:

(*a*) To provide dental students with a broad educational experience to meet each student's individual interests, which could then be pursued in depth throughout the course; since the five years in the Dental Faculty could well be some students' only contact with tertiary education, it should contribute more to their education than merely the acquisition of a set of clinical skills and the scientific and sociological bases of those skills; and

(*b*) To provide a range of elective clinical units around a minimal compulsory core of clinical material; if it were possible to determine the minimum or basic clinical expertise that every dentist should possess, this could be built on with electives. Some of these clinical electives might be used to provide additional practice for slow students and other electives used to teach advanced techniques to very competent students; furthermore, on an individual level, a student could select elective units which would prepare him or her more completely for the type of employment that was contemplated on graduation.

For either or both of these programmes to be implemented, extra time would have to be found: either the allocation of time to existing subjects would have to be reviewed and reduced in some cases, or the total course would have to be extended beyond five years. The Committee aimed for the former and a great deal of consultation and negotiation occurred. It was an auspicious time to contemplate such a dramatic change within an existing Dental Faculty, as the whole University was designing new courses. Thus service departments were willing to listen and to cooperate in meeting other faculties' needs and many basic science courses for dentists were redesigned and some new interdisciplinary courses developed. One of these, cellular biology, which was specifically produced for students in dentistry, medicine and veterinary science, involved the participation of seven different university departments and reduced much duplication that had occurred in some subjects in the old curriculum.

The Committee set an arbitrary target of reducing the total time allocated to existing subjects by 20%. There was a time limit to negotiations, because all proposed changes had to be approved by the Senate in time for the change to semesters to begin in February 1974. The proposals for dentistry that were finally agreed for introduction in 1974 effected an overall reduction of 18.9%. This was not a uniform reduction but ranged from no change in some subjects to complete elimination of others. A few subjects (e.g., orthodontics and biochemistry) were given increased allocations of time.

Table 3 shows a modified version of the First Schedule from the Faculty Handbook listing the credit point rating and total time devoted to each subject. Some significant changes were associated with the compulsory dental subjects. In general, these changes involved moving into an earlier semester some of the clinical material previously confined to

TABLE 3. LIST OF COMPULSORY SUBJECTS IN THE NEW BACHELOR OF DENTAL SCIENCE CURRICULUM (MODIFIED FIRST SCHEDULE IN THE RULE RELATING TO THE DEGREE)

Subject		Prerequisites (Pre) and companion requirements (Co)	Total scheduled hours[a]			Credit points
Code	Name		Lectures	Practicals and seminars	Total	
ID104	Cellular biology I (D V)	Nil	42	28	70	11
ID105	Cellular biology II (D V)	Nil	42	28	70	11
CH123	Chemistry D VI	Nil	42	42	84	12
CH124	Chemistry D VII	Pre: CH123	42	42	84	12
PH112	Radiation physics	Nil	28	14	42	7
AN201	Introductory systematic anatomy	Pre: ID104, 105	28	56	84	10
AN203	Regional anatomy of the head and neck	Pre: AN201	28	56	84	10
DB201	General histology	Pre: ID104, 105	28	42	70	9
DB301	Oral histology	Pre: DB201	28	28	56	8
BC204	General biochemistry	Pre: CH123, 124, ID104, 105	28	42	70	10
BC205	Biochemistry in health and disease	Pre: BC204	28	42	70	10
	or					
BC201	Biochemistry	Pre: ID104, 105, CH123, 124	42	14	56	10
BC202	Biochemistry laboratory	Pre or Co: BC201	—	84	84	10
BC205	Biochemistry in health and disease	Pre: BC201, 202 or 204	28	42	70	10
PL244	Physiology I (dental)	Pre: ID104, 105, CH123, 124 Co: BC204	42	42	84	12
PL245	Physiology II (dental)	Pre: PL244, Co: BC205	42	42	84	12
	or					
PL213	Physiology I (vet. sc.)	Pre: CH123, 124	42	—	42	9
PL214	Practical physiology I (vet. sc.)	Co: PL213	—	70	70	6
PL215	Physiology II (vet. sc.)	Pre: PL213, 214	42	—	42	9
PL216	Practical physiology II (vet. sc.)	Co: PL215	—	70	70	6

TABLE 3 (continued)

Subject		Prerequisites (Pre) and companion requirements (Co)	Total scheduled hours[a]			Credit points
Code	Name		Lectures	Practicals and seminars	Total	
MY281	Basic microbiology for dental students	Nil	28	42	70	10
PL335	Pharmacology A (dentistry)	Pre: PL215 or 245	14	—	14	3
PL336	Pharmacology B (dentistry)	Pre: PL335	14	—	14	3
	or					
PL321	Systematic pharmacology A	Pre: PL215 or 245	28	42	70	10
PL322	Systematic pharmacology B	Pre: PL321	28	42	70	10
DB302	Pathology of responses to injury	Pre: DB201	28	28	56	8
DB303	Oral pathology	Pre: DB301, 302	28	28	56	8
DB401	Neoplasia and bone pathology	Pre: DB301, 302	28	28	56	8
DP101	Preventive dentistry I	Nil	14	28	42	5
DP201	Preventive dentistry II	Pre: DP101	14	28	42	5
DP202	Community dentistry I	Pre: DP101	14	14	28	4
DP301	Community dentistry II	Pre: DP202	14	—	14	3
DP302	Orthodontics I	Pre: PL245, DB301	14	42	56	6
DP401	Orthodontics II	Pre: DP302, DR301, 304	14	42	56	5
DP402	Orthodontics III	Pre: DP401, DS401	14	42	56	5
DP403	Periodontics I	Pre: DB303	14	—	14	3
DP404	Periodontics II	Pre: DP403, DR304	14	42	56	6
DP405	Dentistry for children I	Pre: DR301, DP101, 302	14	42	56	7
DR101	Science of dental materials I	Co: PH112, CH123, 124	14	28	42	5
DR102	Science of dental materials II	Pre: DR101	14	28	42	5
DR201	Dental technology I	Pre: DR102	14	140	154	13
DR202	Dental technology II	Pre: DR201	14	84	98	9
DR203	Operative dentistry IA	Pre: DR102	14	84	98	9
DR301	Operative dentistry IB	Pre: DR203	14	84	98	9
DR302	Operative dentistry IIA	Pre: DR301	14	126	140	12
DR401	Operative dentistry IIB	Pre: DR302	28	126	154	15
DR402	Operative dentistry IIC	Pre: DR302	—	42	42	3
DR404	Operative dentistry IIIA	Pre: DR401, 402	14	126	140	12
DR405	Operative dentistry IIIC	Pre: DR401, 402	—	42	42	2
DR501	Operative dentistry IIIB	Pre: DR404	—	84	84	6
DR303	Prosthetic dentistry I	Pre: DR202	14	84	98	9
DR406	Prosthetic dentistry II	Pre: DR303	14	84	98	9
DR407	Prosthetic dentistry III	Pre: DR406	14	84	98	9
DR506	Prosthetic dentistry IV	Pre: DR407	—	84	84	6
DR304	Occlusion tract	Pre: AN203, PL245, DR202	14	—	14	3
DS301	Oral surgery I	Co: PL336	14	—	14	3
DS401	Oral surgery II	Pre: DS301, DB303	14	42	56	6
DS402	Oral surgery III	Pre: DS401	14	42	56	6
DS403	General medicine	Pre: AN203, PL336, DB302	14	—	14	3
DS404	General surgery	Pre: AN203, PL336, DB302	14	—	14	3
DS501	Oral surgery IV	Pre: DS402	14	42	56	6

[a] In 1975, the number of weeks of teaching in a semester was reduced from 14 to 13, in order to provide a week free from classes which could be used by students for private study. Some clinical subjects have faculty approval for one additional week's classes to compensate for this general University timetabling.

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fourth and fifth years. Since this subject, science of dental materials, had no prerequisite subjects, it could be studied by students in their first year at the University; and the technology courses preparatory to clinical restorative work were available six months earlier in the new curriculum. In a subsequent revision, in 1975, all compulsory preventive dentistry courses were scheduled so that they would generally be completed by the sixth semester (third year).

To facilitate understanding and enrolment in the new curriculum with its elective component, the Faculty Board published a listing of first-year electives and appointed a panel of student advisers. These were members of the lecturing staff of the Faculty of Dentistry who volunteered to act as advisers because of their interest in and commitment to the new curriculum.

In 1974, first-year dental students enrolled in the new unit-structured Bachelor of Dental Science curriculum, and the new course has been in operation since that time. Some lecturers even changed to the new curriculum in later years of the old course, while others continued with the existing structure of the subject in the old curriculum. As a consequence, there is a mixture in the current final years of old and new as the old course is being superseded completely by the new.

ASSESSMENT OF THE CURRICULUM

The new Bachelor of Dental Science curriculum is entering its third year of operation; it is thus still too early for a comprehensive assessment to be made. The problems that have been encountered so far are the problems that could be expected to accompany the introduction of a new curriculum side by side with the old one. Special timetabling arrangements have to be made during the transition period and this is particularly critical where it is intended to move courses such as dental technology and clinical work into an earlier part of the new course. As could be expected, this movement of subjects produces duplication of classes in a given calendar year, and its success is dependent on the availability of physical resources and the resilience and durability of the teaching staff. The task of rostering duplicate class enrolments of over 60 students into a dental technology laboratory with 40 seats is an example of the problems associated with insufficiency of physical resources. Overall, although requiring considerable negotiating patience and skill on the part of the dean, the transition arrangements have proceeded with minimal difficulty.

The Curriculum Committee had set itself three general objectives in designing the new curriculum.[1] They were:

(*a*) At least 20% of the curriculum throughout the course to be available as elective subjects, any or all of which could be used in broad general education;

(*b*) An earlier introduction to dental subjects, particularly to encourage a respect for their scientific and sociological responsibilities and bases; and

(*c*) Greater flexibility in what would be regarded as basic clinical expertise.

In assessing the new curriculum at this early stage of implementation it is perhaps reasonable to examine how well the approved new curriculum meets these objectives and to see if two years of experience have highlighted any major defects or areas of impracticability.

As indicated above, the second objective was met mostly by repositioning the course on science of dental materials and offering a first level elective in social and preventive dentistry. Many students enrol in psychology and sociology as elective units in the first year, but there is still much to be done to encourage a greater interest by students and graduates in the application of the behavioural sciences at the level of clinical experience.

A large measure of success can be claimed in meeting the first objective. There is flexibility in course design: 89 elective credit points form 18.9% of the total required for graduation. As a result, students can select subjects through which to develop a personal educational interest and the range of available areas of study is as wide as a large university can offer. This is particularly important in a situation such as that which prevails in Queensland, where students generally enter dental school directly from secondary school, and receive no other preparative exposure to tertiary education. The technology of dentistry and the relatively small amount of biology and sociology taught to dental students very often tend to become pragmatic in content and presentation and, in those circumstances, it could be argued that the inclusion of an elective component is a necessity and a responsibility.

Unfortunately, the time available for studying electives seems to be mainly in the first year and the fifth year. Such a state of affairs is an improvement on the old course, but it makes only a minimal contribution to providing the basis for a broad general education. If more than token recognition of the philosophy of electives is to occur, the elective component should pervade the course so that areas of interest can be studied in greater depth in successive years. This is physically difficult to time-

[1] KRUGER, B. J. Undergraduate dental education in Queensland. *Australian dental journal*, 21: 82-88 (1976).

table in the second, third and fourth years because of the commitment to compulsory subjects, but the problem might be solved if the staff and students attain a real appreciation of the need for electives.

The difficulty has, however, been further compounded by problems that exist within the University as a whole. When the change to semesters was first proposed, the hope was expressed that efforts would be made to replicate classes within each semester and, if possible, in both semesters in each year. Many arts departments have met this aim to a large extent and quite often a student has a choice of several times for a given subject. Replication has been much more difficult to achieve in subjects with large components of laboratory work. Many science departments provide service courses for large enrolments in a number of professional faculties and meeting these commitments in an interlocking arrangement tends towards rigidity in planning. Since most of these faculties have set courses with no flexibility for electives, the arrangement for them is not only acceptable but desirable.

Despite all the problems, the response by dental students to date has been heartening. Not only are elective units studied in the first year, when timetabling is simple, but some students in each of the later years of the course have already undertaken elective subjects. It has been necessary for some of these subjects to have been studied in evening classes; examples have been advanced levels in anthropology and sociology, government, Japanese, psychology, and Russian.

The most popular first-year electives have been "Dental health in Australian society" and "Comparative dental anatomy", which are offered in the dental course; presumably this reflects a desire to identify with or try out a dental subject. Other very popular first-level electives have been ecology, genetics and evolution, introduction to environmental studies, and psychology. More than three students enrolled in each of a range of subjects offered by the Departments of Anthropology, Sociology, Commerce, Computer Science, Mathematics, Philosophy, Pharmacology, and Psychology; and one or two students enrolled in such subjects as biochemistry, botany, economics, English, engineering, French, geography, German, government, history, Japanese, Latin, physics, and zoology. In answering a questionnaire on the new course, students currently enrolled in dentistry I and II have overwhelmingly (83%) welcomed the opportunity to study electives. The most popular reasons given by the 76 students who favoured retaining electives in the course were that they introduced the student to other fields of study, that it was possible to "relax with" and enjoy the electives, that the student was given a chance to follow subjects of special interest, and that this facilitated settling into university life. The 13 students who opposed electives in the dental course thought that they were irrelevant to the

practice of dentistry, a waste of time and unnecessarily increased the length of the course.

The elective clinical units that were proposed and approved in 1973 totalled some 1614 additional contact hours of clinical practice or associated seminar and assignment work. These proposals were generally considered to be tentative. It was unlikely that students could enrol in most of them before 1976 and it was possible that they would not be a universal reality until 1978. There were other more urgent matters to settle: negotiating relevance in compulsory basic science courses, and determining the practicalities of moving technology courses into an earlier part of the curriculum. Notwithstanding that willingness to postpone further debate on clinical electives, the list of electives did not match the hopes of most members of the Curriculum Committee. The Committee was looking for a fairly large list of small electives that would individualize the ninth and tenth semesters of a dental student's training. It believed that such a list would double as a file of refresher courses for graduates returning to the school in a programme of continuing education and even as qualifying material in preparation for enrolment in the Master of Dental Science degree course.

The Committee recognized, however, that for such a scheme to operate within existing resources, there would have to be a major change in the disposition of teaching staff and physical resources within the dental school. Though ultra modern with regard to equipment, the new facilities have retained the traditional arrangement of clinics assigned for specific work (for example, orthodontics or periodontics) at specific times; and students continue to be rostered to these clinics for specific sessions. As a consequence, elective clinical subjects will also have to be rostered in this manner for the present and therefore the student's ability to extend his or her training in a particular manner will depend very greatly on the fortuitous allocation of available time in a relatively inflexible timetable. Even so, it is anticipated that clinical elective units will operate with some success even at this early stage.

There is a view that the high staffing costs of dental teaching should demand a maximal use of resources and that this is best achieved by making those resources subservient to the demands of the curriculum and the needs of the individual student. Therefore, there is a pressing need for experimentation in order to achieve flexibility in the use of clinical facilities. Moreover, all of the better attributes of learning and responsibility are more likely to flourish in an environment of trust and independence than in one of regimentation; and a patient-centred as opposed to a treatment-centred philosophy is more likely to provide better treatment for the patient and better training for the student.

These views of the majority of the Curriculum Committee encountered opposition in the reluctance of clinical teaching staff to change the *status quo*. An initially encouraging proposal to design a patient-centred programme (to be called "Total dental care") eventually was discarded; and a similar fate befell a move to establish a central diagnostic unit. The relatively small array of clinical electives which were proposed was the result of a reluctance to declare that any clinical material could be anything other than compulsory. It was in this general area that the Committee had great difficulty in obtaining agreement about what constituted basic clinical expertise.

In attempting to prescribe criteria for increasing the flexibility in basic clinical instruction, letters were sent to dental schools around the world. A patient-centred approach, in general, was favoured where teaching was shared and where there was little interest in specific hours for specific clinical material. Some responses, however, indicated that this approach usually introduced some bias, and that this bias was a reflection of the personalities of the staff involved in the administration of teaching. Where the old subject system prevailed, replies showed that the range of contact hours for subjects varied tremendously: for example, one school devoted a maximum of 1000 hours to operative dentistry, 40 to periodontics and 15 to preventive dentistry, while another school allotted 400 hours to operative dentistry, 270 to periodontics and 80 to preventive dentistry.

It is clear that curricula for dental courses may vary tremendously and yet, in any one school, it is difficult to avoid having a rigid, uniform curriculum for all students. This uniformity can hardly be reconciled with the employment situation in which, as has been seen in Australia, dental graduates in a given geographic area will enter a fairly wide range of employment and thereby exercise different proportions of a wide range of skills. Clearly, it would be ideal if the variation in curricula that exists between schools supposedly producing equivalent degrees could exist within a school to cater for the wide range of possible employment situations.

Table 2 (page 34) shows that for the total age-range of the profession, Queensland is different from the other Australian states with large populations, in that some 20% are employed in government dental clinics (including the School Dental Service). Furthermore, during the past decade, a much greater percentage of graduating classes in Queensland have taken salaried employment; and it is conjecture to predict whether that trend will persist or whether the current status (Table 2) will be retained by a drift of more mature graduates into private practice. An increase in the number of dental therapists and an associated growth of the Government Dental Service may very well result in an even larger

proportion of salaried dentists in supervisory and specialist roles. Community health centres and group practices are also likely to increase in numbers in the next decade. Should all or some of these developments occur, there will be an even greater need to provide different streams of graduates whose training reflects their intended employment; and there will also be a need for easily accessible retraining programmes for graduates wishing to transfer their employment or alter the emphasis within a current practice. The system of clinical electives described above could well achieve these needs most economically and effectively. It could go beyond providing for what is currently present and comprehensible, to produce a more malleable organization, amenable to new social pressures and demands within dentistry.

CHAPTER 3

THE MEDICAL SCHOOL OF THE UNIVERSITY OF BRASILIA, BRAZIL, 1966-1976

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EDITORIAL NOTE

The critical analysis of the medical education programme at the University of Brasilia provides valuable insights as to the interdependence of education and sociocultural conditions. The programme as planned had many innovative features, and departed from the then existing pattern of medical education in Brazil. It was intended to develop a health care oriented education rather than focusing on the cure of disease; to give emphasis to psychosocial dimensions, i.e., to be community-oriented; and to provide students with an integrated study programme.

This original plan had to be modified owing to the pressures of rapidly changing conditions, not least the enormous increase in the population of the city of Brasilia and of the Federal District. The account of the programme as it eventually was implemented has hence many important lessons for those who are planning to introduce innovative programmes or educational processes. It dramatically exemplifies how external pressures can and invariably do influence educational programmes.

The medical course at the University of Brasilia was established in 1966, four years after the installation of the first educational progra... by this University. At that time, there were 39 other institutions in Brazil offering undergraduate programmes in medicine but the University of Brasilia was the second such institution in the middle west, the region where the new capital was located.

The medical course was created in a decade of rapid change in the country. The political decision to move the capital from Rio de Janeiro to the middle-west hinterland started a migratory movement to the area, which until then had been a rural and very sparsely inhabited part of the country. By 1960, when the commemoration of the creation of the new city was held, the Federal District already had a population of 140 000. Ten years later, when the first medical class graduated from the University, the population had reached 546 000.

The population of Brazil had been growing rapidly for many years. In 1960, some 71 million people were living in an area of approximately 8.5 million square kilometres, an increase of more than 19 million since 1950. This growth continued at a rate of 2.8% per year during the next decade. The migration to urban centres was intensive and, by 1970, about 59% of the population were urban dwellers. At that time, illiterates still constituted 34% of the population above 14 years of age.

In the past few years, the economic growth of the country has surpassed the demographic growth. The per capita gross national product was US $ 546 in 1970 and is estimated to reach US $ 1121 by 1980. The proportion of the labour force employed in primary sector activities has been decreasing. Population and economic indicators show a disparate geographic pattern of distribution; for example, the per capita income in the richest state is seven times higher than that in the two poorest states together.

HEALTH STATUS

As might be expected, the poor are not as healthy as the rich. The general mortality rate was 9.9 per 1000 population (in 1970); the proportional mortality (meaning the proportion of total deaths represented by deaths of people aged 50 or more) for the country as a whole is about 40%, but the percentage varies from 28.5 in the poorest geo-economic region to 54.0 in the richest. The child mortality (meaning the percentage of deaths of children less than five years old within total deaths) shows an inverse relation: from 25.5 in the richest regions to 51.2 in the poorest.

Although about 50% of the total population is covered by the social security services, the distribution pattern of health care resources follows the unequal distribution of the economic pattern. The national ratio of hospital beds per 1000 population in 1973 was 3.6 (range 1.0-6.4) and the supply of physicians had reached the ratio of 4.9 per 10000 population (range 1.4-16.4), but about 18% of the total population did not have any source of regular medical care.

The measures of use of health care resources also display a wide range. For example, the range of hospital admissions per 1000 population between the poorest and the richest regions was from 19 to 103 (national average 68), in the same year.

Regarding the organization of health services, a recent event that portrays a new trend was the enactment in 1975 of a federal law that attempts to create a national health system by organization and regulation of the network that provides health-related services.

The geo-educational influence of the University of Brasilia is exerted mainly within the Federal District. The area had an estimated population of 795 000 in 1975. Half of this population was younger than 20 years of age and the birth rate was 38 per 1000 population. Although the annual per capita income reached US $ 900 in 1973, about 63% of families had a yearly income of US $ 200 or less. Also, the extraordinary rate of demographic growth, due mainly to the migratory flux, has prevented a proportional increase in housing, sanitation and health care facilities in the territory.

Among the general measures of health status, the one that showed the least variation since 1960 was the mortality rate. The principal causes of death were enteritis and other diarrhoeal diseases, and accidents; approximately 20% of the total deaths were due to communicable diseases.

The infant mortality rate (deaths of children less than a year old per 1000 live births) showed a greater decline, from 91.0 in 1964 to 54.4 in 1974. The main causes of death in this age group were enteritis and other diarrhoeal diseases. The proportional mortality increased from 22.4% to

25.1% in the last five years; of course, this indicator reflects also the age composition of the population.

Measures of perceived need are not easily available, although there is no reason to think that the perceived need is greatly different from the pattern observed elsewhere. For example, the index of sick days per 1000 population is reported to be around 200 days for a two-week period.

The operation of health care resources is largely under public service control and the decision-making is centralized in the Federal District. The supply of hospital beds is small (3.3 per 1000 population) and 90% are short-term beds. The number of outpatient rooms per 1000 population is 0.5 (public service only).

The number of physicians had shown a steady growth even before the University started producing graduates in 1970. The ratio that now prevails (25 per 10 000 population) is the highest in Brazil. This growth has been made possible by the extraordinary expansion of the educational system in the country in the last 15 years.

EDUCATIONAL RESOURCES

In the 1950s, the most pressing need as perceived by both the public at large and the governmental authorities was for the growth of opportunities in tertiary education in the country. In 1957, there were 13 students per 10 000 population enrolled in tertiary education. The number of graduates in 1959 was 16 000, including 1500 physicians. In 1960, about 12 000 candidates applied for 1750 medical school places.

Public opinion was also roused by the discussion of such issues as the low general ratio of physicians to population, the geographic maldistribution of physicians and the indications of ill health in the population. This led to a governmental authorization for the creation of a great many new medical courses (mostly in privately operated but also in state-owned schools) in several cities.

The expansion of the medical education system was astounding. By 1972, all regions of the country had schools for the health professions and their distribution followed the demographic pattern more closely than the economic pattern. In this same year, there were 73 authorized medical courses in the country and more than 6000 physicians graduated.

Planning for expansion was not altogether a well-ordered process. The recruitment of teachers to staff the new schools was hampered by the lack of organized postgraduate programmes. Hospital facilities for clinical training were difficult to arrange and financial resources for operation and maintenance were not forthcoming. Likewise, the shortage of libraries and ancillary resources for education and research was troublesome.

The serious distortions that occurred led to a re-examination of the manpower planning policy and to a re-evaluation of medical education in the country.

In 1972 the Commission on Medical Education of the Ministry of Education, after an analysis of the problem, observed that the accelerated expansion of the educational system was draining the available resources and threatening to unbalance the job market, besides contributing to a decrease in the quality of teaching in general. The Commission recommended a moratorium on the creation of new schools (no authorization has been conceded since then) and proposed stricter requirements for their operation. Its members also expressed the view that the current number of graduates was adequate for the operation of the medical care delivery system.

A recent trend in health manpower development has been the change in the federal policy, which now emphasizes the development of postgraduate education. Thus, postgraduate programmes for medical qualification, including higher degree programmes, have been intensified. The National Postgraduate Programme estimates that about 1650 candidates will have received a postgraduate degree in health sciences by 1979. The upgrading of research, teaching and technical qualifications of medical graduates should improve the recruitment and selection of staff for the new and expanding medical schools such as that at the University of Brasilia.

THE MEDICAL SCHOOL OF THE UNIVERSITY OF BRASILIA

The 1962 master plan of the University of Brasilia provided for a school of medicine and allied professions (faculty of medical sciences). The planning of the medical education facilities evolved in the first semester of 1966 under a tight schedule on account of the growing expectations of premedical students and in response to the recognition that there was a shortage of physicians in the region.

The preclinical facilities were located temporarily in the building of the central institutes of sciences, allowing the admission of a class of 78 students in August 1966. Besides the teaching facilities, some research laboratories were planned from the start and were in operation two years later. This helped to lessen the burden of recruiting staff.

By October 1966, an agreement had been made between the University and the Hospital Foundation of the Federal District (a health care delivery public service organization) for operation of the Sobradinho community hospital as a teaching hospital designed to provide comprehensive health care for the population of that town. The first class was to start the clinical phase in 1968 and to graduate in 1970 after completing the internship

year; however, the Federal Council of Education did not fully recognize the legal standing of the medical course until July 1972.

The implementation of the basic features of the plan has been influenced by decisions taken by the consecutive deans of the faculty since 1966, although the most conclusive decisions and those of most lasting consequence were made early in 1966 by a planning group which defined the minimal requirements for the organization and operation of the new school. Thereafter, a study group of professors from several institutions in the country developed the institution's educational policy and curriculum. This group was very influential in the recruitment and orientation of the initial staff that planned the courses.

Some prevailing circumstances in the 1960s facilitated the adoption of this innovative plan: the pioneer mentality, boosted by the youthful population of the new city of Brasilia; the lack of vested academic interests, related to the absence of any medical school in the region; the role of the University of Brasilia itself, created as an agent of change in the field of tertiary education; and the attributes of the health care services in the territory of the Federal District.

Organization

The new Statutes of the University, in effect since 1970, establish the Faculty of Health Sciences as one of the nine academic units (schools and institutes) constituting the University.

The Faculty of Health Sciences is organized into four departments entrusted with the professional cycles of the courses of medicine, physical education and, starting in the very near future, nursing and nutrition (dietetics). The director of the school is the dean of the faculty council (Department Council), the advisory and deliberative body of the institution. The vice-director is the director of the hospital.

The departments directly committed to a course in the University are also represented on the educational commission (the Career Congregation) entrusted with the planning, coordination and supervision of the curriculum work for that course. This body, also headed by the director of the school, has representatives in the Education and Research Council of the University.

Such an organization contrasts with the model adopted in the country before the reform launched by the creation of the University of Brasilia. There was then a manifold division of independent schools nominally bound into a university. In each school there were as many as 30 or more autonomous chairs. A shorter span of countrol is a key feature in the centralized administration of the university.

Faculty and students

There are now 80 teachers staffing the three departments of medicine of the Faculty of Health Sciences and, contrary to the usual pattern in other Brazilian schools, most of them (87.5%) are full time. There are 11 full professors and 15 associate professors. Staff appointment by the rector of the University depends on the recruitment and recommendation by one of the departments and the approval by the faculty council. A distinguishing feature of the institution is its effort to recruit staff committed to teaching and willing to work full time.

Students are admitted to the university basic cycle (college) by a general entrance examination that has the purpose of verifying knowledge of secondary education subjects and of ranking the candidates. Although the admission policy requires the indication of a career choice at the entrance examination, the student should confirm his option after completing a number of credits in basic disciplines. Transfers (changes of course) are allowed to promote better vocational adaptation.

The number of medical candidates admitted was fixed at 96 per year in 1967, but it changed several times over the following five years. Since 1973, 48 students have been admitted twice a year (January and July). They come from all parts of the country, with the central states of the federation supplying the largest share. Their motives for choosing medicine as a career are protean; however, such factors as the need for contact with patients as people, the opportunity to do good, the quest for independence, and family encouragement appear to be prevalent. The medical student enrolment (professional registration) is now 560 and there is a male predominance at a ratio of 2.4:1. The proportion of females has, however, doubled since 1967.

Facilities

Educational facilities for the medical programme include 12 multidisciplinary laboratories designed and equipped for integrated preclinical teaching for a 190-student load, besides ancillary facilities for anatomy and histopathology. Research laboratories and experimental surgery facilities are open to students by means of electives and apprenticeship work. These resources are increasing quickly, particularly in the fields of nutrition and tropical medicine.

The general educational facilities of the University are also available, such as the expanding central library resources for day and night use, holding over 320 000 publications and more than 6000 periodicals (1262 biomedical).

A special feature of the clinical educational facilities are the community health settings operated by the institution. Besides the hospital, with 220

beds and outpatient and emergency services, there are neighbourhood and outpatient services available by agreement with institutions of the health care delivery system of the Federal District; the hospital network of this system is also open, by agreement, for the internship period, thereby increasing the breadth of the range and complexity of available health settings.

Budget

The principle source of funds for the operation of the institution is the Federal Government, through the University administration. There is no student tuition fee and a growing proportion of the budget is obtained from income generated by extension services, as exemplified by the health care delivery activities of the Faculty of Health Sciences.

In 1974, the operational budget of the school was about US $ 1.3 million. The budget of the Sobradinho hospital was US $ 2.3 million. Research funds are not included in these totals.

The total annual cost per medical student was estimated to be US $ 6300 in 1974 but all expenses for the maintenance of the hospital health services were included in this figure. Excluding such expenses, the cost was about US $ 3400 per student per year.

From the beginning, assistance to the institution was forthcoming from the health care services administration to provide facilities for patient care, as shown by the agreements with both the local hospitals organization (an agency of the government of the Federal District) and the public health agencies of the Ministry of Health. A recent revival of this support has been the agreement on the extension of primary care in rural areas within the general regionalized development programme of the country.

Many organizations in the country and abroad have provided support for the development of the extramural activities of the institution's programme, in particular the Brazilian Ministry of Health, the World Health Organization, the Ford Foundation, and the Kellogg Foundation.

The improvement of the teaching/learning process has, however, been pursued by the faculty with much less support, except that provided by the University itself along the guidelines of the academic administration.

THE MEDICAL EDUCATION PROGRAMME AT BRASILIA

Before 1966 all medical education programmes in Brazilian institutions followed the same curricular plan: a six-year course comprising a basic sciences phase in the medical building and a clinical phase in a charity hospital. Most disciplines of the curriculum evolved in one academic year and were taken in a strict sequence. In many schools, the traineeship period (sixth year) was a fellowship programme in either clinical medicine

or basic research. There were no electives and all the required courses were biomedical or clinical disciplines, about 36 altogether, among which public health and preventive medicine were inconspicuous. The chairmen of the disciplines determined their content without much ado.

The medical education programme of the University of Brasilia was viewed from the beginning as a new prescription to suit the needs of medical development and of health problems in the country.

Several concepts were influential in the development of the educational programme, such as: health as a multilevel state with organic and psychosocial dimensions; disease as a state resulting from the impact of perturbations at any of many levels, both at organic and at higher level aggregates; medicine as a multiprofessional endeavour directed to the care of the person as such, and to the person in the family and in higher level aggregates; and medical education as an integrated teaching and learning process aimed at fostering the cognitive tools and the scientific disciplines required for the development of health manpower resources.

A key factor in the acceptance of the initial concepts was the dissatisfaction of many physicians and teachers who had undertaken postgraduate training abroad with the academic policies and patterns of educational and service programmes in their institutions. A better balance between education, research and service activities was needed and a broader view of medicine was aimed at: what can now be understood as the systems view of man and its implications to medicine.

These feelings fitted an educational paradigm that implied, on grounds of efficiency and effectiveness, that both the study and the practice activities should be subsumed in the graduation period of medical education. As such, the medical student would start with an experimental view of health and disease in the multidisciplinary laboratories and would end with an experiential participation in the delivery of comprehensive health care provided by the community hospital.

The overall institutional goal was defined in 1966 to be "the preparation of physicians able to perform a broad role in medical care to the benefit both of the individual and of the community". A capacity for the physician to perform multiple functions in health care was envisioned.

This orientation was extended to the formulation of the educational objectives of the medical course as they appeared in the 1969 catalogue:

(*a*) To teach the knowledge pertaining to health and disease conditions (ecologically defined) as well as the measures required for health promotion and protection and for the treatment of illnesses;

(*b*) To foster the development of a scientific approach through the pursuit of active learning and an adequate balance between exposition and experimentation;

(*c*) To develop new attitudes and values regarding medicine, emphasizing health and not only illness, community work and not only hospital work, teamwork and not only individual work, and multiprofessional approach and not only medical approach; and

(*d*) To train the student in laboratory techniques and to develop the skills required for clinical and surgical activities, besides full acquaintance with the routines of the health services.

Further specification of these purposes, in order to define the learning objectives for the whole programme, has not been accomplished in an effective way notwithstanding the efforts of some teachers.

Curriculum strategies

The innovative features that differentiate the medical education programme of the University of Brasilia from other programmes in the country may be linked to three major strategies, referred to in the order of their implementation:

(*a*) An integrated approach to the organization of basic sciences teaching and correlation between the normal and the abnormal in the study of organ system structure and function;

(*b*) A community-service orientation to clinical teaching, based on the health care delivery services of the teaching hospital and the allied agencies;

(*c*) Flexibility in the curriculum framework, facilitating self-pacing and self-construction of curriculum work, under the guidance of the student adviser.

These interacting factors were related to the goal of preparing a physician suited to the performance of a broad role in the practice of medicine, as a primary care generalist, or a medical specialist (after residency training), or an academic professional worker (after taking a higher degree postgraduate course).

The preclinical phase was implemented between 1966 and 1967. The integrated approach was selected on the assumption that it would provide better correlation among the subjects and would increase the motivation of the students.

In the clinical phase, implemented between 1968 and 1971, the community-service orientation was used as a tool to develop a broader approach to health problems, both in their recognition as well as in the implementation or delivery of health care measures appropriate to the problems. It was hoped that this could help to produce a physician more

adapted to the delivery of primary care under conditions of restricted resources in rural settings or impoverished areas.

A main reason for the gradual adoption of the flexible curriculum framework since 1972 was the need for better linkage between the medical programme courses and other courses available in the University, besides the provision of more individualization in the plan of studies.

Following the academic guidelines of the University, the medicine-oriented student is expected to complete a number of credits in the basic cycle (akin to a premedical college course) prior to admission to the professional cycle or course. Before 1970, such credits were taken by registration in required disciplines at the Institute of Biological Sciences. Since then, the breadth of choice has been expanded to include almost any discipline if the prerequisites are complied with.

The guidelines established for the medical course required the student to follow the professional cycle in a sequence of three phases: first, the preclinical phase featuring teaching of basic medical knowledge and scientific orientation; second, the clinical phase, grounded in a community hospital emphasizing comprehensive medicine; and third, the training phase in one or other of the affiliated hospitals of the public service system of the Federal District, featuring either a rotating or a straight internship.

The preclinical phase was conceived as an ordered sequence of programmes (teaching blocks) blending concentrated study and the integrated teaching approach to the basic medical sciences. It was introduced with a course on mechanisms of aggression and defence, contrasting pathology and public health views of health and disease. The subsequent courses were devised as the integrated study of the organic systems, both the morphological and functional aspects in the normal and abnormal states. This phase required three terms, the last one comprising the courses on the alimentary, urinary, endocrine and reproductive systems.

The clinical phase was devised to consist mainly of practical experience in the wards, outpatient and emergency rooms and in the extension services in the community, to induce in the student a progressive sense of responsibility in dealing with health problems at all levels. The body of knowledge to be learned was purposely patient-oriented and not disease-oriented.

Again, a sequence of blocks was adopted in the unfolding of the educational activities. In the first term, there was a programme on community medicine (emphasizing the ecological perspective and the focus on the family), including field work, and another on initiation to clinical medicine, comprising both physician-patient relationship and interview and physical diagnosis. In the second term, there were clinical and surgical clerkships carrying out work in the wards and outpatient rooms. The third term was planned to link the clerkships in paediatrics and

obstetrics and gynaecology, encompassing the full variety of settings for the care of mothers and children. The fourth term has been used to date for specialty programmes (psychiatry, ophthalmology, forensic medicine, and otorhinolaryngology) and miscellaneous learning activities in clinical medicine, although it was envisioned in the curriculum plan as a period of work in comprehensive medicine.

The whole educational activity in the clinical phase was intended to be based in the services delivered by the community hospital to the town of Sobradinho (population in 1967 of 25 000) comprising not only the range from ambulatory to intensive care but also extension care reaching population groups at greater risk. Altogether, the delivery of health care to the people of Sobradinho amounts to a major obligation of the Faculty.

In the 11-month internship period, the student has a choice of hospitals in Brasilia or the satellite towns of the Federal District (including Sobradinho). It was devised as an inservice training phase, mostly in wards, outpatient, emergency and operating rooms, but also providing field work or laboratory experience on an elective basis. Rotating internship consists of periods in internal medicine, paediatrics, surgery, and obstetrics and gynaecology, any of which can be elected for straight internship.

Overall, in the premedical period, disciplinary teaching is predominant and the courses emphasize core material. In the preclinical phase, content is integrated around organ system themes from which the curricular components were developed. In the clinical phase, problem-solving teaching predominates and patient-oriented themes subserve the learning activities even in the community medicine programme. Finally, there is inservice training, allowing a measure of vocational choice, in the internship. In this period, the student is already practising medicine under supervision.

This curricular plan was followed in rigid sequence until 1971. After that, the curricular contents were blended in a new framework requiring registration by discipline at each term and allowing a more flexible plan of study and the incorporation of electives. The teaching blocks in the clinical phase were resolved into their components to match the operational plans of instruction. Programme expansion and change was made easier by the new framework and among the electives incorporated there is a remote site (rural) traineeship in a setting of regionalization of primary care.

Another trend facilitated by the new framework is the self-pacing of curricular work. By increasing or decreasing the number of credits taken at the regular fall and spring terms (and at the special summer term), the student can shorten or lengthen the span of the medical course.

Learning activities

A variety of approaches have been used to help the students develop the basic knowledge, skills and attitudes consonant with the general orientation of the programme.

A general way to assist the student is the provision at the beginning of term of a plan of instruction for the courses for which the student has registered. Such outlines list the general objectives, learning activities, texts of reference and ancillary materials, evaluation procedures and contents of a course. Sometimes syllabi are provided to define core material and blend subject contents.

The implementation of educational activities that foster student participation is aided by the practice of dividing the class into smaller groups at registration. Seminars oriented to the application of knowledge are favoured. In some schemes, a clinical problem is examined from such perspectives as the boundary conditions (data basis), pathogenic sequence of events, strategies of diagnosis and management.

Recently the use of student-oriented learning groups has accentuated the tendency to expand the student role and to stimulate the problem-solving activity in the teaching/learning process. This approach is aided by study guides that define the boundary of the problem, identify objectives and sources of information, and provide questions to polarize the discussion. Formal and informal participation of the student in the teaching role as a way of facilitating learning has been gradually expanded since 1973.

Another approach that has limited use on account of the demands on time and resources is the field project. In one such activity, preclinical students collect, analyse and interpret real data from persons in areas where the University maintains extension services.

The emphasis on laboratory exercises in the preclinical phase has lessened. Experimental animal models were often used, sometimes providing an opportunity for the student to use a variety of methodological approaches to biomedical themes. Preclinical learning seems to be better advanced now by the use of the multidisciplinary laboratories as the home base for the students and the setting for varied teaching/learning experiences.

Likewise, the diversity of settings of clinical experience is used to develop role adaptation. Another facilitating factor is the role modelling provided by the direct activity of the teaching staff in health care delivery at the community hospital. Role-playing techniques are also used.

Active participation of the student in the delivery of health care is a main feature of the whole clinical programme. And it was the worst affected in the critical years of the development of the programme; the number of lectures increased almost as if in response.

Outcomes

Although the attributes expected of the medical graduates are not explicitly stated, they may be inferred from the goals, curricular plan, and learning activities. It seems that the institution expects graduates to:

(*a*) Be action-oriented to a greater degree;

(*b*) Command a base of knowledge of wider scope, regardless of the level of scientific understanding;

(*c*) Show a greater extent of concern with the community as the focus of medical action;

(*d*) Value the preventive approach to medicine and the accent on health maintenance; and

(*e*) Display better role adaptation regarding health care settings and the role of the physician.

Owing to the nature of the institution's programme, another outcome of interest would be an improvement in the health status of the target population of the community of Sobradinho.

ACHIEVEMENTS OF THE PROGRAMME

One of the shortcomings of the project for the medical course was the lack of a definite protocol for the evaluation of the programme. Also, there were no standardized evaluation procedures in current use in the country, such as the examinations of the National Board of Medical Examiners in the United States of America. Another point is that the initial emphasis was on the assessment of the acceptance of the innovative features by the students and the staff and not of the long-term effects of the programme.

Most of the time, the programme was monitored on a short-term basis by questionnaires submitted at the end of a course to assess the perceptions of the students. Interest in the programme by members of other institutions was noted and, in fact, the reactions of others were the most important evidence of the achievement of the staff in the implementation of the programme.

Since 1971, this approach has been supplemented by the introduction of general performance monitoring, general survey of students, and staff interviewing by the Career Congregation. These procedures were used to provide a broad description of the processes and of some results of the programmes that could be related to the following questions:

(*a*) Do the students learn the curricular material?

(*b*) Is scientific understanding fostered by the learning activities?

(*c*) Have new attitudes and values been developed regarding medicine?

(*d*) Is there sufficient training pertaining to animal experimentation and laboratory techniques and to the development of clinical skills and task orientation?

(*e*) Are the objectives of the required course of the professional cycle consistent with the overall goals of the programme?

(*f*) Is there any aspect of the programme affecting the pattern of career choice of the students?

(*g*) What is the learning perspective that attracts the students most before they start the medical programme?

Measures of student performance are basic tenets of programme assessment and are considered first. Failure and drop-out rates and a cumulative weighted average have been used to assess student performance. Academic standards at the University require the student to keep a cumulative weighted average of above 3.2 (range 0.0-5.0) and to pass in at least four disciplines every two consecutive terms. No registration is confirmed if the minimal pass index is not maintained or a cumulative weighted average of below 3.2 is repeated for more than three terms, unless there is a valid justification. These ratings are based on the criterion standard letter-grades reported for every discipline in which the student has registered. The performance in the medical programme is evaluated by examinations of different formats, with emphasis on multiple-choice questions, direct observation and written report.

Another procedure used to assess achievement is a survey questionnaire completed by 566 students (representing 80% of the school's graduates) since 1972 at the admission to the internship period. This survey provides information on the career aims and background of the students, besides their perceptions regarding achievements and opportunities and other reactions to the programme. The analysis of the data provided by this questionnaire is under way but some information related to the present study was processed early in order to extend the information already provided by the teachers and students informally or through the reports to the academic administration.

Monitoring of staff achievement has been restricted to information regarding responsibility for course management and amount of teaching, besides papers published and research and development work. The interviewing conducted by the Career Congregation has been directed to the examination of the plans of instruction regarding the objectives, learning activities and evidence of achievement.

The 1974-1975 figures show that medical teaching staff facilitate teacher-student contact to a greater extent than the University staff at large; the average size of class is smaller (21 students per teacher) and the average amount of teaching hours is greater (10 hours per week per

teacher). On the other hand, a survey conducted in 1972 (and the situation has improved since then) revealed that, according to the staff, the degree of work satisfaction was determined by the following factors in decreasing order of importance: personal achievement in the tasks undertaken, the nature of the activities, and the responsibility for tasks.

An examination of the plans of instruction for the 27 required courses of the professional cycle showed that the course objectives, even if operationally undefined, were generally consistent with the overall goals already stated, although the balance of emphasis was given to knowledge building in detriment to attitude development. The instructional activities most frequently prescribed were lecture, seminar and role playing or enaction. Again, in the evaluation procedures, the assessment of knowledge receives much greater attention than the affective and psychomotor dimensions.

As a rule, all the teachers see much room for improvement in planning and implementation of the courses, although not many would agree with a change in the balance of the learning objectives. In 1974, a tentative plan to seek acceptance and support for such a change was interrupted by the vacation, although it had involved about half of the staff in seminars and small group discussions on objectives and evaluation procedures.

Regardless of the doubts about the effectiveness of the planning and implementation of courses, the data collected indicate that the scholastic performance of the medical students is satisfactory. More than 40% graduate with a cumulative weighted average equal to or above 4.0 and about 60% feel that their personal performance was good or excellent. The failure rate (percentage of failing grades) and the drop-out rate (1.5%) of the medical students are less than one-third of those of the student body as a whole.

Information pertaining to graduates is harder to obtain. About 67% of them apply for residency training programmes and a higher percentage of the candidates graduating from this school in comparison to other schools are approved in the examinations held for training programmes in the Federal District. Altogether, this evidence indicates that the knowledge goal of the programme is attained, even though criteria and standards are not strict.

Less evidence is available concerning the attainment of the goal of scientific understanding. The cumulative weighted averages are lower during the preclinical phase and only 6.7% of the students have a cumulative weighted average of above 3.9 at the end of this period. This may be related to the pattern of major interest in different perspectives of medicine that students reveal at the beginning and at the end of the course, as can be seen in the following tabulation.

Number of students	*Stage of studies*	*Greatest interest in perspectives of medicine (%)*				
		Social	*Psychological*	*Organic*	*Research*	*Responsibility for patients*
100	Pre-medical	6.7	12.2	47.7	14.4	18.8
566	Clinical	12.1	5.5	32.3	12.2	37.8

The percentage of students indicating a major interest in learning about research before starting the medical course was 14.4% and this proportion did not change by the end of the course. Not more than 12% were engaged in research work during the course; the same proportion of graduates intended to obtain higher academic degrees in medicine. There was a significant decrease, from the beginning to the end of the course, in the number of students indicating a preference for activities in basic sciences and research.

As far as the programme goal related to the promotion of new attitudes and values is concerned, the evidence of achievement is not much stronger. Most students (75%) acknowledged an acceptance of the preventive approach to medical practice. One-third of the graduates valued the idea sufficiently to exhibit a preference for the use of free or elective time in doing extension work in rural medicine; and about 18% selected extramural work as the learning activity to be expanded in the medical education programme. Conversely, an association was found between student statements of not being affected by the idea (12% of the total) and their indications of preference for medical laboratory work.

Not many students at the premedical stage identified a predominant interest in learning about the social aspects of health and disease; actually, it was the least interesting perspective for half of them. Although the proportion of students interested in social medicine increased to 12.1% by the end of the course, this finding cannot be proved to be a significant result of the curricular experience. It should be pointed out that 2.3% of the graduates gave a career choice of public health and preventive medicine but none made this choice when entering university.

Training in laboratory techniques and animal experimentation was a programme goal that lost much emphasis along the way. Laboratory practice is still prevalent in the preclinical courses but only 15% of the graduates consider sufficient the opportunities for practice of laboratory techniques in the clerkships; however, only 8% selected laboratory work as the learning activity to be expanded in the programme and very few have taken electives in laboratory medicine.

The goal of training clinical skills has gained emphasis over time, notwithstanding the restrictions of available resources. At admission to

internship, 25% of the students stated that they had had sufficient opportunities for taking clinical responsibility for the care of patients and 38% for attendance of patients during the evolution of illnesses. Also, 26% of students stated that they had had sufficient opportunities for the performance of medical procedures. In fact, according to 47% of the clinical students, learning practical skills was the most difficult undertaking of the course. The interest in taking responsibility for patients was significantly greater among students at this stage than among beginners.

The degree of clinical proficiency of the students may be reflected in their grades in the clinical phase and during internship, although the evaluation procedures used are not the most appropriate to assess this attribute. With due allowance for the limitations of the assessment, it may be accepted that training goals are achieved.

The pattern of career aims of the graduates was also recorded in order to study the influences of the learning milieu on the decision made by the student. On examination of the preferences for broad career areas at the beginning and at the end of the course, the most significant feature was the increased preference for activities involving responsibility for patients. About 44% of the students changed their earlier preferences.

About half of the graduates indicated a choice of career in primary care, either in internal medicine (17%), general practice (16%), paediatrics (11%) or obstetrics (8%), but surgery was the preferred career choice (18%). The initial percentages for these choices were surgery (35%), paediatrics (15%), obstetrics (7%), general practice (5%) and internal medicine (4%). The increase in the preference for general practice and internal medicine is significant.

It is of interest that 52% of the clinical students selected outpatient clinic work as the learning activity to be expanded in the programme.

Inasmuch as the University is graduating more physicians than required to maintain the present level in the Federal District, it is to be expected that a good proportion of the graduates will move to other places. In fact, 25% of them intended to practise in small towns, villages and rural areas, while 27% expected to stay in the Federal District.

Overall, the effectiveness of the programme cannot be clearly determined because definite criteria and standards were not agreed upon at the outset. The usual expectations have been accomplished: in six years there has been an output of 700 physicians with a low attrition rate and a favourable performance in examinations. Other institutions readily accept these graduates.

It seems beneficial to the country that as many as 14% of the graduates decided to start general practice in areas with poor or no regular medical resources. Career aim is an appropriate criterion for the goals of the programme and a measure of its effectiveness is the difference in per-

centage registered in the stated preference for primary care practice before and after the medical learning experience. Feedback from the practice settings is, however, needed to ascertain the role that these graduates perform and to check the data obtained in the assessment of attitudes and values.

There is widespread agreement among the staff that the programme is worthwhile, although many deplore the apparently low efficiency of the educational process.

In a recent meeting of the faculty there was general agreement that programme monitoring should be revised and adapted to the present needs of the institution. A new protocol for evaluation is to be designed and implemented next year with a view to assessing the inputs, processes and results of the medical programme in its current operational framework. This will require a new effort to determine the kind of students entering the programme (their needs, personalities, and motivations) and the learning outcomes aimed at, besides defining the teaching models used.

PERSONAL OBSERVATIONS

Reviewing these results leads to a feeling that the attainment of the high-sounding goals of the original programme has been delayed and that the programme has not fully achieved its objectives.

The institution has faced many problems in the implementation of the activities, described above, some deriving from the environment of medical education in the country in the last decade. New policies were devised and established in this period of rapid expansion that affected the operation and development of teaching hospitals and curtailed the hopes of an expansion of the clinical facilities of the school.

In addition to legal constraints, administrative, financial and occupational obstacles prevented the differentiation and development of the original model. The implementation of new academic policies in the University, starting in 1970, abolished the autonomy of the school's programmes and restricted educational experimentation on administrative grounds.

The cost of partially financing the expenses of the Sobradinho hospital has been a burden to the University, mitigated only by the benefits of the delivery of health services to a population that doubled in ten years. The indicators of health status of this population have consistently improved for several years and in many aspects the town has better rates than the Federal District as a whole.

Deficiencies of staff resources have been a limiting factor in many institutional activities. On account of the shortage of medical teachers, recruitment is difficult and the rate of departure is 10% a year due to job dissatisfaction and to attraction by the conditions of work in the medical services of Brasilia.

The admission of students was regulated only after 1971, and the student load quickly surpassed the available facilities. When the first class graduated in 1970, more than 700 students had already been admitted to the medical course. The restriction of opportunities for practical work reached a critical point three years later.

Many deficiencies in implementation may be ascribed to shortcomings in the medical programme itself. The planning was not systematic on account of the pressing needs and changing environment of tertiary education. Both an accurate data base and an understanding of the educational system dynamics were lacking to the extent needed for decision-making. Because of their absence, policies have been determined by the resolution of cross-pressures, analogies drawn from other situations and, sometimes, from the imagination and foresight of a few pioneers.

As a result, evaluation of capabilities was superficial. Teacher development was left aside in the beginning, perhaps with the idea that the power of the new message would overcome the barriers; however, learning a new role of adaptation to programme and student needs proved to be rather difficult for some teachers. And any educational innovation will fail unless teachers are willing to spend the necessary time and energy to make it work.

Also, efforts to gain the acceptance and support of key people involved or affected by the innovatory programme were wanting. Agreements were not always reached and the plans were not readily consolidated with the plans of the central administration, to support the goals and objectives of the University. Altogether, these difficulties and drawbacks forced many of the people involved in the initial planning and implementation to resign and move from Brasilia. The faculty was close-knit for too short a time; low turnover ceased after three years and now, ten years after the establishment of the programme, only 37% of the founding faculty remain.

This remaining body preserved the original programme as a shared idea, notwithstanding the expansion or truncation of its constituent elements in the enactment of the activities by teachers and students.

A few features of the programme had to be modified from the start, either because of misjudgement or because of unfulfilled hopes. Such was the case with the depreciation of bedside teaching, which was postponed for as long as possible to avoid undue disease-orientation. Outpatient

teaching, however, proved inefficient for rapid learning of physical diagnosis, given the supervision and facilities available and the patient load.

Another case was the home visit by the student and acceptance of responsibility for a group of families. Discovery of illnesses and related social factors without a viable programme of action led to frustration and reversal of the expectations concerning the community approach. The development of a research-based programme of maternal and child health care, with emphasis on nutrition, provided a sound framework to community work but at the cost of decreasing the participation of the student.

Research as a teaching tool did not evolve to the extent anticipated and the emphasis on laboratory work diminished. Examination of objectives and evaluation procedures showed that often such work was costly and inefficient. Elective courses and opportunities for research apprenticeship were used as alternatives.

The most important modifications in the original plan were the adoption of a flexible system for registration, incorporation of electives, change in prerequisites and duration of the courses; these have gradually been implemented since 1972. The general design was to open four main educational avenues, related to learning styles and interests, by means of elective courses and apprenticeships: (*a*) on the nature and discovery of medical knowledge; (*b*) on the development of strategies of medical action; (*c*) on the utilization of knowledge in medical tasks; and (*d*) on the identification of the needs of people.

Recently, upon the recommendation of the Departmental Council, all courses were scheduled on a term base (15 weeks) and comparisons with compact teaching (concentrated study) were undertaken. The dean of the Faculty explained that term scheduling was an experience in academic administration aiming to provide full integration of the medical courses in the curriculum framework adopted by the University.

A change resulting from this adaptation was the gradual loss in the distinction between premedical, preclinical and clinical phases. The standing of the student in the course is determined by the credits accomplished and no longer by the year of study. A possible disadvantage may be the difficulty in patterning a learning sequence of activities based on the medical role.

New changes are under study, with a view to establishing a continuum of experience in the settings of primary, secondary and tertiary levels of care in the context of regionalization of health care.

The full implementation of the proposals depends on new agreements for joint operation of another hospital in the area of Brasilia and of the building of the new educational facilities for the Faculty of Health Science.

CHAPTER 4

THE McMASTER PROGRAMME OF MEDICAL EDUCATION, HAMILTON, ONTARIO, CANADA: DEVELOPING PROBLEM-SOLVING ABILITIES

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EDITORIAL NOTE

The School of Medicine at McMaster University was founded in 1969. It is an example of a new school established at an existing university. The original planners at McMaster sought to create a programme of medical education that would remedy some of the deficits of the health care system. In recognition of the fact that medical education models of other times or other societies were not applicable to local conditions and needs, an attempt was made to develop an innovation programme.

In the McMaster system, the admissions process was modified in an attempt to use criteria that might correlate with characteristics McMaster hopes its graduates will possess, such as the ability to work in groups, to solve problems, and to be dedicated to people. The educational programme is an example of the integration of subject matter according to medical problems as opposed to a discipline-based course organization of the curriculum. Small group or tutorial instruction is a predominant mode. Under guidance, students are encouraged and assisted in taking a greater degree of responsibility for their own learning. Some of the clinical training is community-based and opportunities are provided for experience in primary care.

One of the more important responsibilities of instructors was in deciding what, of all that students might be expected to learn, would actually be required. Problems associated with this difficult educational decision are evident and many factors influence the choice of curriculum content. To what extent, for example, does McMaster's problem-oriented integration of the subject matter restrict what is taught to that which is of greatest clinical usefulness? On the other hand, does the search for clinical relevance of subject matter tend to eliminate concepts that might have future clinical value, even if this is not evident at present? The process by which curriculum content decisions are made also has an influence. At McMaster, decisions regarding what students are expected to know about anatomy, biochemistry, etc., are not made is isolation by specialists in these areas; instead, the curriculum content is established by multidisciplinary groups.

It is evident that the education of medical students according to this new pattern is enthusiastically accepted by staff and students. It is likely that such a strong sense of common purpose has contributed to McMaster's achievements.

Hamilton, a city with over 300 000 inhabitants, is known as Canada's "steel town". It is also known in medical circles as a family physician's town where local specialists usually act purely as consultants to the family physicians. At the same time, family physicians admit their own patients to hospitals and coordinate their care both in hospital and at home. The medical school is situated on the University campus, which has a strong development in science and is well known for its work in nuclear and solid state physics.

In Canada, health and education are provincial responsibilities. Research is supported by federal, provincial and independent agencies. Health care is provided to the citizens through the provinces on a cost-shared basis with the Federal Government. Most physicians are remunerated on a fee-for-service basis, although in many parts of the country alternative methods of physician remuneration are being tested.

The hospital insurance component of health care insurance was introduced first and physician services in the office or outpatient setting were provided later. This, together with the general trend of medical practice, has given rise to a heavy emphasis on the hospital sector with resultant rapidly increasing costs.

At present, all health manpower planning is based on recommendations from a Human Resources Committee of the Ontario Council of Health. This Council of Health is an advisory body of the Department of Health of the Government. The Government establishes the size of the classes for each health sciences school and now also determines immigration quotas of professional health personnel from other countries.

THE MCMASTER PROGRAMME

When the School of Medicine at McMaster University was founded, the original planners began to search for ways in which they could remedy through education some of the deficits of the health care system. Any educational system, particularly for the health sciences, must be sensitive to the local needs. Models of education developed to meet needs of other times or other societies are not applicable to new programmes in medical education. It is necessary to consider the needs of the society to be served and to study these needs carefully so that the educational programme can begin to respond within existing financial constraints.

What were some of the projected problems in the health care system in Canada to which the new educational programme in medicine might respond?

The admission process

Medical education begins with the selection of students. Traditionally, in Canada, the majority of medical students have come from the middle and upper classes and have been selected on the basis of ability to obtain high marks in university examinations. The Admissions Committee at McMaster felt that ability to obtain high marks in written examinations did not necessarily correlate with future excellence as physicians. The Committee began to look at other means of identifying students who would be more likely to achieve the objectives of the School. Such students would, after training, be able:

(*a*) To identify and define health problems, and search for information to resolve or manage these problems;

(*b*) Given a health problem, to examine the underlying physical or behavioural mechanisms. A spectrum of phenomena might be included, from molecular events, to those involving the patient's family and community;

(*c*) To recognize, maintain, and develop personal characteristics and attitudes required for professional life, including: awareness of personal assets, potential, limitations, and emotional reactions; responsibility and dependability; and ability to relate to and show concern for other individuals;

(*d*) To develop the clinical skills and methods required to define and manage the health problems of patients, including their physical, emotional and social aspects;

(*e*) To become a self-directed learner, recognizing personal educational needs, selecting appropriate learning resources, and evaluating progress;

(*f*) To be able to assess critically professional activity related to patient care, health care delivery, and medical research;

(*g*) To be able to function as a productive member of a small group that is engaged in learning, research, or health care; and

(*h*) To be aware of, and be able to work in, a variety of health care settings.

The admissions process looks for evidence of past performance that demonstrates dedication to people, the ability to work in groups and the ability to solve problems. Students are initially brought in for an interview after selection that is based on an autobiographical letter plus an academic record with at least a "B" average standing. The letter is rated independently by a faculty member, a medical student and a community member. This reduces over 2000 applicants to 450. There are no prerequisites for any subjects but the students must have had at least three years of university experience.

By using faculty staff, students and members of the community, the interviewing process for some 450 students can take place during two weekends. The students are first interviewed by a representative of each of the above three groups. These interviewers have been trained and each independently rates the applicant. Following this, the applicant takes part in a "mock tutorial" with five or six other applicants in which the group deals with a general problem. Here the applicants are evaluated on their ability to interact in a group, to solve a problem, to think clearly and to express themselves. The final step in the admission procedure is the collation of all the information, where the applicants are reviewed blindly, and 100 students are selected to enter the first year of the medical school.

It must be recognized that the "autobiographical letter" is an imperfect instrument but it does serve as one way of cutting down the number of applicants to a manageable number for interview. There have been problems of intergroup variation between interview teams, but with training and careful monitoring this is gradually being minimized. The performance in medical school does not seem to correlate in any way

with the academic standing before entry into medical school, nor does it correlate with a science or a non-science background.

The tutorial approach

The planners of the school recognized that at present, and perhaps even more so in the future, physicians must function as members of a health team working with a variety of disciplines. The school therefore developed a tutorial system to promote learning in a group setting. Interdisciplinary experience is being introduced at the clinical level. A typical McMaster tutorial consists of five or six students with a tutor. Here the students begin to learn some of the concepts of small group dynamics and how to work together to learn as a group. Initially this creates anxiety because students are exposed intellectually and emotionally. Most faculty members require special training to enable them to function in the tutor role, so faculty "tutor training" workshops are held on an ongoing basis for faculty members both long-standing and newly recruited. Once the resources are developed, learning based on tutorials is no more expensive in faculty time than traditional education.

Problem-based learning

The planners recognized that professional health workers should learn through problem solving because for the rest of their lives, either in clinical practice or in research, they will be solving problems. The educational programme was therefore based on a series of biomedical problems that could be presented in writing, on videotape, on audiotape, or in the form of a "simulated patient". To facilitate this system of learning, a great deal of faculty effort went into developing an appropriate series of biomedical problems along with the resources required to solve these problems. The resources include not only traditional facilities such as library, laboratory, anatomy and pathology museums, but also audiovisual aids with tape slide shows and videotapes as well as simulated patients and computer simulations.

Problem-based learning represents an alternative to studying blocks of classified knowledge in an organized sequence. The students bring to the problems all their previous information and expertise as well as their ability to think rationally. As they begin to ask questions, issues become defined which require further information. The learner then engages in a search of both basic and clinical science necessary to the solution of the problem. This approach overcomes the traditional dichotomy between clinical and basic science, and introduces students to the relevance and the excitement of basic science.

What difficulties has learning through problem solving created? It does tend to create existential anxiety in students because the student

is given no defined limit to the requisite knowledge and therefore must learn to establish limits to the knowledge needed to cope with any particular biomedical problem. Initially, the students realize the almost infinite store of knowledge potentially available and they find this overwhelming, in contrast to their previous experience, in which sequential packages of limited knowledge are required to pass an examination. Nevertheless, this reflects the real situation that professional health personnel must live with for the rest of their lives. Experience has shown that, after about six months, students successfully define realistic goals and objectives that they can achieve without anxiety.

In addition, questions have been raised by educators who feel very strongly that basic core knowledge or core content can be defined and made obligatory. While the series of biomedical problems are so designed to involve most fundamental concepts in the basic and clinical science of medicine, it is obviously impossible to learn everything and educators must therefore place their trust in the students' ability to seek out information, to grow in knowledge and learn for the rest of their lives.

Self-directed learning

It is hoped that problem-based learning will enable students to become life-long learners able to assess changing health care needs and to keep up with the evolving science of medicine. The graduate can do this best by prior learning of the technique and responsibility for organizing his or her own learning; hence the undergraduate must learn how to manage information efficiently with proper reading habits, a personal filing system, a discriminating consultation of expert opinion and use of notes, journals, texts and other aids.

This approach to stimulating the student to become a self-directed learner for life has been an integral part of the undergraduate medical programme at McMaster. The student must be able to establish goals or learning objectives depending on prior background and future goals. To do this, students must be able to evaluate themselves so that they know where they are academically, where they are going, and, finally, when they have arrived. Such self-evaluation is carried out in the tutorial setting and is checked with fellow students, the tutor and, when necessary, another faculty member expert in the area under consideration. The School believes that this approach to education will facilitate life-long continuing education.

Primary care

In addition to these points of learning methodology, the planners at McMaster recognized an unfortunate tendency for increasing speciali-

zation among postgraduate students, even though primary care was a major need. How could a new school reverse the decreasing interest in primary care family medicine?

To interest medical students in primary care family medicine, they must be exposed to family physicians as practitioners with academic status equal to that of members of other disciplines. Primary care physicians are active faculty members contributing to the educational programme and, at present, the Chairman of the Undergraduate Education Committee is a family physician. In the first year of medical school, the student is attached to a family physician practising in the community and spends time there to learn basic clinical skills and to develop a concept of primary care. Subsequently, the students spend a compulsory portion of their clerkship working in family medicine in a university or community-based office setting. At McMaster, approximately a quarter of the curriculum is elective and many students spend their elective time working in family medicine. The School has developed a network of primary care teaching practices in its surrounding district and in north-western Ontario. Both students and residents work in these practices.

Community-based teaching has required considerable expenditure of energy and time by both the community practitioners and the University faculty. Workshops have been required to orient the practising community physicians to the goals and approaches of an educational programme which is very different from their own undergraduate experience. Furthermore, since the practising physician in Canada is usually paid on a fee-for-service basis, he or she must be recompensed for loss of income during the time spent on educational activities. In Canada, the emphasis on funding for health sciences education has been through the hospital sector or through the university directly without any way of paying for a community base for education. The government of Ontario is now recognizing that if education is to take place appropriately within the health care system, money must be made available to support this activity. While increasing the community base for education decreases the demand for in-hospital educational experience, it is obviously impossible to abolish programmes that are an established and a necessary component of the health care system, even though they are hospital based.

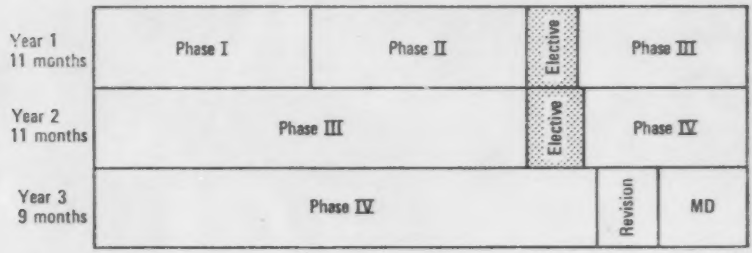
A problem in health care delivery in Canada relates to the maldistribution of physician manpower and the inability to place physicians in more remote isolated communities. To respond to this, in cooperation with the provincial government, the Faculty of Health Sciences at McMaster University has developed a cooperative programme with physicians in isolated north-western Ontario. Students and residents rotate through these remote practices, faculty members visit them, and the practitioners

come to the University for continuing education activities. This to and fro exchange has created excitement and vitality in the practices in that part of the country so that graduates of McMaster are beginning to practise in that area and the physician shortage has been largely overcome.

THE CURRICULUM

To achieve these objectives, a curriculum had to be designed that would obviate the basic science/clinical science dichotomy and be consistent with problem-based learning in a tutorial setting. To make the most efficient use of expensive physical resources, the undergraduate programme lasts three years. There are four phases (see Fig. 1). In the first phase, the student becomes familiar with small group learning and learning through problem solving. The most highly skilled tutors work in Phase I

FIG. 1. PLAN OF CURRICULUM



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to help the students to cope with the emotional stress of a new educational system which requires them to define their own educational objectives within the unit objectives and to utilize resources efficiently to achieve these objectives. They also become familiar with the local health community. The content of Phase I relates to growth, aging and development, with an overview from genetics to senescence. After ten weeks in Phase I, the students move on to Phase II, during which they study the body's response to a variety of stimuli, including viruses, bacteria, ischaemia and drugs. They then enter the third phase, which is one year in duration. In Phase III, the students study biomedical problems relating to body systems: the gastrointestinal, haematological, cardiopulmonary, neurological, locomotor, psychiatric, endocrine, reproductive, and osmoregulatory systems. During this phase, the students also see patients with problems related to the system under consideration to develop related

clinical skills. In fact, clinical skills are developed throughout the programme, beginning with interviewing in Phase I and, later, appropriate history taking and physical examination. The final or fourth phase is a clinical clerkship which combines hospital and ambulatory care experience in the traditional disciplines; medicine, surgery, obstetrics and gynaecology, and paediatrics, as well as family medicine and psychiatry. Sixteen weeks of the Phase IV clerkship is elective and the students, in conjunction with faculty staff, design clinical experiences to meet their own needs and career goals.

PERSONAL OBSERVATIONS

To implement a programme that was designed to meet the perceived deficits in the Canadian health care system, it was apparent that a new form of faculty organization would have to be instituted to take the responsibility for educational planning away from the relatively narrow perspective of traditional university departments. With this in mind, an Education Committee was made up of individuals dedicated and expert in medical education but not representing departmental constituencies. In this way, the educational programme could be looked at in a more balanced manner without the usual conflicts about curricular time. For example, the Department of Anatomy does not decide what anatomy is to be taught, but rather the Education Committee negotiates with the Department of Anatomy for the resources needed by undergraduate medical students.

Whether the School will achieve the stated objectives can only be determined over a period of time. A long-term study comparing the graduates of McMaster with those of other Canadian schools is being planned and implemented.

The initial impression of four graduating classes is that the graduates function effectively in the health care system and are quite able to pass the content-oriented national examinations of the Medical Council of Canada. This would indicate that McMaster students are acquiring a body of knowledge comparable to that possessed by graduates of other Canadian schools; only the long-term follow-up study will determine whether the education programme is achieving its other objectives. The faculty remains optimistic about the prospects.

CHAPTER 5

FIJI SCHOOL OF MEDICINE, SUVA, FIJI: FROM MEDICAL ASSISTANTS TO PHYSICIANS

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EDITORIAL NOTE

The evolution of the Fiji School of Medicine is described in its historical perspective. Originally designed to capitalize on the experiences gained in training "Native Medical Practitioners", a traditional training programme for physicians was established in 1961.

How far the present programme is meeting the requirements of effective health care in Fiji and how far the present programme is appropriate or relevant to health needs of Fiji are matters of conjecture.

The programme shows the influence of external registration requirements, a common feature of many educational programmes. There is now considerable pressure for the School to become a full professional and graduate school of medicine. This raises the question of whether the School should aim for legitimation according to Western standards with the accompanying risk of wasting valuable resources in attempting to copy models from highly sophisticated and industrialized countries. Graduates from such a school would not be suited to the health service system within which they are to practise.

The Fiji Archipelago is a cluster of over 800 islands, atolls and reefs set in some 425 000 square kilometres of the Pacific Ocean. Comprising a total land area of about 18 000 square kilometres, it extends between 15° and 22° S. latitude and between 174° E. and 177° W. longitude. Fiji is thus centrally situated among the island territories of the south-west Pacific and acts as a gateway to them. About 100 of the islands of the Archipelago, the largest of which are Viti Levu and Vanua Levu, are permanently inhabited.

Discovered in parts and in succession by Abel Tasman (in 1643), James Cook (in 1774) and William Bligh (in 1789), Fiji was ceded to the United Kingdom on 10 October 1874, becoming a crown colony.

Fairly regular European visits to Fiji began early in the 19th century, in ships from the East Indies seeking sandalwood and *bêche-de-mer*. Missionary settlers arrived as early as 1835 and a British consul was appointed in 1857. From the 1860s, labour was being imported to work in the cotton plantations but from the late 1870s mostly Indians were brought to work in the sugar-cane plantations.

The original Fijian population at the time of cession was about 200 000 but by 1919 it had fallen to 83 000 largely because of the introduction of diseases to which the population had no immunity.

In 1975, the population was estimated at 570 000, with 51% Indian and 42% Fijian, the rest being made up of a number of different races. Demographic characteristics are similar to other developing countries: 46% of the population is under 15 years of age; and there is a considerable inflow of rural dwellers to towns (by 1973, 33.8% of the population lived in the 13 towns and the city of Suva).

The old élitist system of education selected and moulded a small group of academically superior pupils through a system of increasingly stringent

examinations, with the majority of pupils falling by the wayside. The new aim is to provide an appropriate and relevant education, whether formal or nonformal, for every individual.

HEALTH

The Minister of Health is responsible for the administration and control of the Ministry and for effecting health policies laid down by the Cabinet. Overall supervision of the Ministry is the duty of the Permanent Secretary for Health, who is responsible to the Minister for professional advice and for the executive aspects of the health programme (see Fig. 1).

Fiji is divided into four administrative divisions—Central, Northern, Eastern and Western—each headed by a divisional medical officer, who supervises, controls and coordinates the work of medical and nursing staff as well as the health inspectorate and other departmental personnel within the division.

Each division is in turn divided into a number of subdivisions each under the administrative care of a subdivisional medical officer, who is assisted by a health sister and a health inspector.

A subdivision consists of 3-4 or more areas each in the charge of an area medical officer. Finally, each area is further broken down into nursing zones or districts, which are under the care of a public health nurse-midwife.

There are four main hospitals, one for each division, in addition to 11 subdivisional hospitals, 3 area and 3 special hospitals as well as 45 health centres.

The health centre is the basic unit in the structure of the Ministry of Health. Developed from the original group of grass huts, the present models are built of concrete and wood. Three types have been evolved:

(*a*) Small health centre with facilities for a doctor and district nurse;

(*b*) The same as (*a*) but set in isolated areas and with, in addition, a single-bedded resuscitation room for dealing with emergencies; and

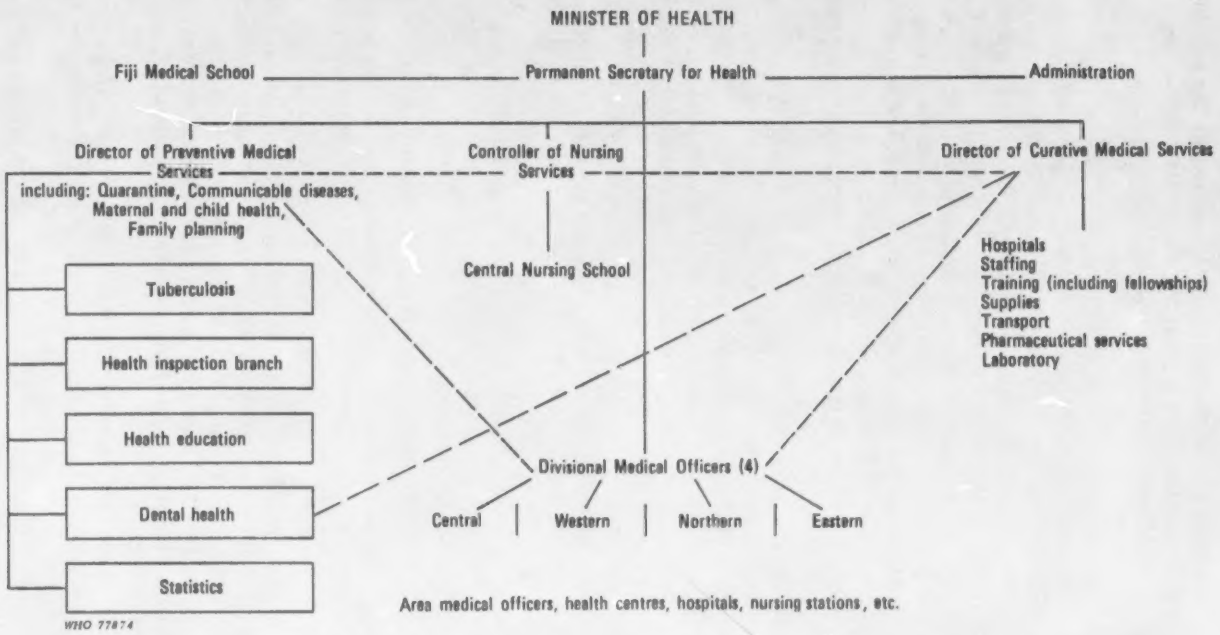
(*c*) A larger type, which is usually a subdivisional headquarters.

The broad objectives of Fiji's health services are to promote the physical, mental and social wellbeing of the nation; to protect Fiji's young and old from illness and disease; to provide adequate clinical facilities and staff to satisfy the medical and dental needs of both rural and urban populations; and to promote a better standard of living through a lower birth rate.

With these stated objectives, future policy emphasis will shift towards expanding preventive services and family planning while maintaining the curative services at their present level.

Since 1960, there has been a change in the pattern of causes of death in

FIG. 1. ORGANIZATIONAL CHART: HEALTH DEPARTMENT, FIJI (AS AT NOVEMBER 1973)



Fiji. For example, deaths from communicable (including parasitic) diseases moved from second to eighth place (16% to 7%) of total mortality, while those from accidents and violence increased from 4% to 8%. In 1972, the number of deaths from cardiovascular diseases were more than a third of all deaths in hospitals. Neoplastic disease was the third most important cause of death, accounting for 9%.

Public demand for medical services has continued to increase to the point that outpatient services in hospitals and larger health centres have become grossly overburdened. Between 1963 and 1972, outpatient attendance increased from 1.6 to 2.4 visits per person and inpatient admission from 68.9 to 82.1 per 1000 population. The number of general beds available in Fiji is 1660, or 2.9 beds per 1000 people. There is also evidence that the people have developed their own expectations of the health services and the role of the doctor within the services.

Recent statistics, show that the death rate is 4.92 per 1000 population and the birth rate is 29.83 per 1000. Infant mortality is 20.60 per 1000 live births and the average life expectancy is 68 years. The fertility rate is 133 per 1000 women of childbearing age. Future health targets include:

(*a*) The reduction of the birth rate to 22 per 1000 by 1980;

(*b*) Limiting the natural population growth to less than 2% per annum;

(*c*) The development of health worker teams to assist in the treatment of patients at health centres and nursing stations;

(*d*) The development of new health centres or nursing stations and renovation or replacement of certain existing ones for better coverage of rural populations;

(*e*) The attainment of a physician/population ratio of 1:2000;

(*f*) The training of health personnel to be task-oriented; and

(*g*) The provision of incentives for qualified health workers to work in rural areas.

In the country's attempts to reorganize the health services according to recent policy, four main problems have been identified:

(*a*) The general shortage of doctors in rural areas;

(*b*) Doctors being sent to centres where they cannot use their skills;

(*c*) A heavy load of work for nurses in areas where there is no medical officer; and

(*d*) Difficult access to the health centre deterring the most isolated people from travelling to them for assistance.

The health team has been expanded to include a health assistant below the grade of a qualified doctor; the three-year training programme for health assistants started in 1975. It is expected that by 1980 about 30

health assistants will be ready to join the health teams working in rural areas. The average per capita cost of medical services is estimated at Fiji $ 15 per annum (US $ 15.8) or about 3% of gross domestic product. Between 1971 and 1975, an estimated 9.8% of the Government's capital expenditure was devoted to the health sector, compared to only 8.4% in the preceding five years.

In 1975 the number of local and expatriate doctors working in Fiji in both public and private service was 244, of whom 205 had been locally trained. This represents a doctor/population ratio of 1:2300 although the ratio varies in different areas, ranging from 1:1674 in the Central Division to 1:3969 in the Northern Division. For the first time, Fiji is experiencing a brain drain of its professional health manpower. Recent legislation entitles graduates of the Fiji School of Medicine to take up private practice after six years' service with the Government. More recent graduates have been able to pass the ECFMG (Educational Commission for Foreign Medical Graduates) examination in the USA and have emigrated. A few others have not returned after postgraduate training in Australia and New Zealand.

It is expected that, by 1980, the number of doctors in private practice will have increased to 75, compared to 49 in 1975. If services are to be maintained there will have to be an additional 88 doctors.

The role of traditional healers

The traditional medicine of Fiji still plays a part in people's lives. Healers are mainly consulted when patients are not fully satisfied with doctors and herbal medicine is still popular. In remote and isolated areas, healers have rendered some help to the sick. The Government has recently legalized the practice of acupuncture and chiropractic in this country.

Western medicine has, however, gained the confidence of the people of Fiji, judging by the increase of outpatient attendance in hospitals, health centres and general practitioner clinics.

THE FIJI SCHOOL OF MEDICINE

The history of the Fiji School of Medicine is intimately linked with the history of Fiji. The following documents were consulted in compiling a description of the School's past:

Native Medical Practitioner's Ordinance 1888, Suva, Government of Fiji.

HOODLESS, D. W., *Central Medical School*, 1946, Suva, Government Printery.

CLUNIE, T. & MCCUSTY, W. T., The Native Medical Practitioner in the Western Pacific and the Central Medical School in Suva, Fiji. *Tropical diseases bulletin*, November: 826-833 (1936).

EDMONDS, The Fiji School of Medicine. *Journal of medical education*, 37: 478-490 (1962).

CASSIDY, J. T., The Fiji School of Medicine. *New Zealand medical journal*, August: 511-515 (1967).

Medical Department Annual Reports, 1902-1972, Suva, Government Printery.

Minutes of South Pacific Health Board Meetings, 1946-1962, Suva, Government Printery.

Legislative Council Proceedings, 1927, Suva, Government Printery.

Minutes of the Advisory Board Meetings, 1928-1962.

Minutes of the Academic Board Meeting, 1946 to date.

LAMBERT, S. M., *A doctor in paradise*, London, Dent, 1946.

MORRIS, C., *Report of the higher education mission in the South Pacific*, London, H.M. Stationery Office, 1966.

ALEXANDER, N., *Report on the University of the South Pacific*, 1967, Suva, Government Printery.

IRVINE, R. ET AL., *Report on the medical education in the South Pacific*, 1971, Suva, University of the South Pacific.

Fiji's Development Plan 7 (1976-1980), Suva, Government Printery.

At the request of the Chiefs, Fiji was ceded to the United Kingdom in 1874. In 1875, provision was made for the salaries of a chief medical officer and one district medical officer. In the same year, a devastating measles epidemic hit the Fiji population and killed 40 000. In fact, it was King Cakobau (ruler of Fiji) and his sons, returning home after the cession of their island to the United Kingdom, who introduced the measles epidemic to a nonimmune population. The advent of Indian immigrants, in 1878, from areas where smallpox and cholera were endemic, drew the attention of the health authorities to the necessity of protecting the people of Fiji. In order to make vaccination less costly and more widely available, it became necessary to inaugurate a system of training local medical assistants; European vaccinators had proved too costly and somewhat unsatisfactory. Young Fijian men had already worked as dressers and dispensary assistants and it was decided to entrust them with greater responsibility as public vaccinators.

In 1879, Dr William (later Sir William) McGregor proposed to the Government that the best Fijian students be trained by himself in certain practical aspects of patient care. It was not until 1884, however, that the Native Practitioner Ordinance provided that "any native who had attended as a medical student for three years at a public hospital in the colony and had at the end of that period passed an examination in medicine and surgery should be entitled to a certificate as a Native Practitioner. He might then practise medicine and surgery in a district

specified by the Chief Medical Officer." The graduate was to reside in the village directed by the Senior Native Official of the Province and was visited three or four times a year by a European medical officer acting in a supervisory capacity.

The first graduates received their certificates in December 1888. Their training had been mostly practical; trainees spent their mornings as dressers, while afternoons were devoted to lectures and dispensing. When the Colonial War Memorial Hospital was opened in Suva in 1923, this system continued although students now learned their profession in its wards, receiving clinical instruction from the resident medical officer and practical procedures from the matron.

The effectiveness in Fiji and elsewhere in the Pacific of these assistant medical officers, as they eventually came to be termed, prompted the International Health Division of the Rockefeller Foundation to consider them as a possible solution to the problem of bringing Western scientific medicine at reasonable cost to the peoples of the South Pacific.

Negotiations between the Rockefeller Foundation and the Government of Fiji resulted in the building and founding of the Central Medical School in 1928. Since one of the conditions for Rockefeller support was the opening of the School to students from other parts of the Pacific, teaching had to be in English whereas, up to then, it had been in Fijian dialect. A further development was the introduction of a written curriculum. In 1961, the school was renamed the Fiji School of Medicine.

Finance and administration

The Fiji School of Medicine was originally financed as a division of the Medical Department of the Government of Fiji and administered by a principal, under the direction of the Permanent Secretary for Health for the Dominion. An Advisory Board was established in 1928 to give policy advice to the Permanent Secretary. Since 1946, the functions of the Advisory Board have been relegated to the Academic Board, which is chaired by the principal and is responsible for all academic and technical aspects of teaching. The Academic Board is particularly concerned with such matters as: the curriculum and its periodic revision; appointment of internal and external examiners; examination standards; organization of clinical studies; and discipline.

Currently members of the Academic Board include: the principal, the tutor, the senior tutor or lecturer in anatomy, physiology, surgery, clinical medicine, obstetrics, paediatrics, pathology and preventive medicine, a consultant in surgery, medicine, pathology, obstetrics and gynaecology, the Medical Superintendent of the Colonial War Memorial Hospital, the Secretary of Education and, in disciplinary meetings, the President of the Fiji School of Medicine Students Association.

CURRICULUM

The Fiji School of Medicine now offers a five-year course (see Fig. 2). The first-year subjects include physics, chemistry, biology, English, statistics and psychology. The second-year courses include anatomy, histology, physiology and biochemistry. In the third year, students learn pathology, microbiology, clinical pharmacology and the behavioural sciences. These courses are followed by two years of clinical and didactic teaching in medicine and surgery.

Obstetrics and gynaecology are introduced in the fourth year. Special courses in paediatrics, anaesthesiology, ophthalmology, tuberculosis and leprosy control, forensic medicine and psychology are also conducted. With the opening of the Nuffield Department of Public Health in 1959, preventive medicine has been given greater emphasis and is now taught during the fourth and fifth years. As part of the course, students, accompanied by teaching staff, make two- or three-week trips to one of the outer islands to undertake comprehensive health surveys. Students are also attached to district hospitals for two-week periods.

In the fifth year, students are attached to surgical, medical, obstetric and paediatric wards. Here procedures such as lumbar puncture, paracentesis and thoracentesis are learned. In the obstetric ward a student is expected to conduct 20 normal deliveries.

On successful completion of the final examination at the end of the fifth year, the student is granted the Diploma in Surgery and Medicine of the Fiji School of Medicine. A year of internship is required only of nationals.

EDUCATIONAL OBJECTIVES AND ACADEMIC POLICIES

The basic aims of the School, when it was first created, were:

(*a*) To train carefully a number of selected students as "Native Medical Practitioners" to carry out medical and health work in their own groups, bring medical help to a large number of their own countrymen who had hitherto been out of reach of medical assistance, and, by preventive measures, raise the general standard of health throughout the islands;

(*b*) As the need arose, to provide postgraduate courses for practitioners who had trained at the School; and

(*c*) By working in close cooperation, to inculcate a spirit of friendly relationship and assistance between the various island races in the Pacific.

The essentially local character of the service was stressed as much as possible in the living conditions of the students, who were encouraged "to dress ... after the manner of well-bred natives [and] to retain all their

FIG. 2. COURSES AT THE FIJI SCHOOL OF MEDICINE

	First year	Second year	Third year	Fourth year	Fifth year
School certificate	University entrance (New Zealand) / Preliminary (medical)	Diploma of Surgery and Medicine	Diploma of Surgery and Medicine	Diploma of Surgery and Medicine	Diploma of Surgery and Medicine
		Diploma of Dental Surgery	Diploma of Dental Surgery	Diploma of Dental Surgery	
	Dietetics	Dietetics	Dietetics		
	Physiotherapy	Physiotherapy	Physiotherapy		
	Laboratory technology	Laboratory technology	Laboratory technology		
	Radiography	Radiography	Radiography		
	Hygiene	Hygiene (practical)			
	Medical assistants	Medical assistants	Medical assistants		
	Dental mechanics	Dental mechanics	Dental mechanics		
	Dental hygiene/therapist	Dental hygiene/therapist	Dental hygiene/therapist		
	Pharmacy	Pharmacy	Pharmacy		

Secondary-school courses

University of the South Pacific preliminary course

Fiji School of Medicine courses

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native manner of living that was passable under the condition of studentship. This ensured that graduates returned to their homes with a wholesome respect for the customs and manners of their own people and glide easily into their proper groove in the native social system, whence they could most readily spread the knowledge they had acquired." Although this statement is quaintly worded, the sentiment expressed is still valid. The necessity of tailoring the training of medical practitioners to the particular needs of the country is still as imperative as ever. Doctors and engineers need to be reminded that they must keep in close touch with the population they serve and not become alienated from it by their position and learning.

Nowadays, the principal function of the School is the training of selected students to a standard acceptable for registration in medicine and dentistry for work in the South and Central Pacific.

Diplomas in Medicine and Surgery or in Dental Surgery are issued. Students are accepted from various Pacific islands (see Table 1).

Although the training of medical and dental officers is the principal function of the School, a number of ancillary medical courses are also offered (see Table 2). In addition, postgraduate and refresher courses for medical graduates are held annually or by special arrangement.

The training takes into consideration the special conditions under which graduates will work. At some stage in their careers, graduates of the Fiji School of Medicine will be working in remote areas often with difficult communications and with no access to modern diagnostic and laboratory facilities. They are therefore trained in the basic art of clinical medicine and at the same time oriented towards public health. For this reason also, simple dentistry is taught to medical students.

Approaches used in helping students to develop knowledge, skills and attitudes

With a full-time tutor in each clinical discipline and in social and preventive medicine, training is systematic and organized. Full-time tutors have also ensured teaching on a more scientific basis and the theoretical knowledge of the present graduates has been greatly strengthened. Lectures are given regularly; tutorials and small group discussions have now become a regular feature. Trained in the local milieu, in a school which has thus tailored its curriculum to local requirements, these medical graduates have been the backbone of the profession in the South Pacific in general and Fiji in particular.

Fijian students must serve one year of compulsory internship before they are eligible for full registration. Until 1973 a student qualifying from the Fiji School of Medicine could work only in the civil service; private practice was not permitted. In June 1973, the Fiji Government granted

TABLE 1. STUDENTS[a] ENROLLED AT THE FIJI SCHOOL OF MEDICINE IN COURSES FOR THE DIPLOMA IN MEDICINE AND SURGERY AND THE DIPLOMA IN DENTISTRY, BY YEAR OF COURSE, FEBRUARY 1975

Country or area	Medicine and Surgery						Dentistry					Post-graduate
	I[b]	II	III	IV	V	Total	I	II	III	IV	Total	
Fiji												
Indian	24(8)	21(8)	18(9)	7(3)	7(2)	77(30)	3(–)	4(1)	3(2)	2(1)	12(4)	1(–)
Fijian	6(3)	6(1)	1(–)	1(–)	3(2)	17(6)	2(1)	—	—	—	2(1)	—
Others	1(1)	4(–)	—	—	1(–)	6(1)	—	—	—	—	—	—
Total	31(12)	31(9)	19(9)	8(3)	11(4)	100(37)	5(1)	4(1)	3(2)	2(1)	14(5)	1(–)
Tonga	3(3)	—	—	1(–)	3(–)	7(3)	—	2(–)	—	—	2(–)	—
Western Samoa[c]	2(–)	2(1)	—	—	—	4(1)	1(–)	1(–)	—	—	2(–)	—
Tokelau	—	—	—	—	—	—	—	—	—	—	—	—
Cook Islands	1(–)	—	—	—	1(–)	2(–)	—	—	—	—	—	—
Niue	—	—	—	—	—	—	—	—	1(–)	—	1(–)	—
Nauru	—	—	—	—	—	—	—	—	—	—	—	—
American Samoa	—	—	—	—	1(–)	1(–)	—	1(–)	—	—	1(–)	—
Trust Territory of the Pacific Islands	—	—	—	—	—	—	—	—	—	—	—	—
Solomon Islands	2(–)	—	—	—	2(–)	4(–)	2(–)	—	—	—	2(–)	—
Gilbert and Ellice Island Colony[d]	2(–)	—	—	—	1(–)	3(–)	—	—	—	—	—	—
New Hebrides	1(–)	—	—	—	—	1(–)	—	—	—	—	—	—
Total	42(15)	33(10)	19(9)	9(3)	19(4)	122[e](41)	8(1)	8(1)	4(2)	2(1)	22(5)	1(–)

[a] Figures in brackets indicate the number of women students in the total.
[b] At the University of the South Pacific, Suva.
[c] Now named Samoa.
[d] Now two separate entities: Gilbert Island and Tuvalu.
[e] Plus 6 visiting students.

TABLE 2. STUDENTS[a] ENROLLED AT THE FIJI SCHOOL OF MEDICINE IN AUXILIARY MEDICAL AND DENTAL COURSES, BY YEAR OF COURSE, FEBRUARY 1975

Country or area	Dental therapy		Laboratory technology			Radiography			Dietetics	Hygiene		Medical assistants	Pharmacy[b]	Total
	I	II	I	II	III	I	II	III	II	AHI[c]	RSH[d]	I	I	
Fiji — Indian	4(4)	3(3)	7(5)	6(–)	8(4)	4(1)	1(–)	1(–)	4(4)	13(1)	2(–)	6(–)	4(3)	63(24)
Fiji — Fijian	2(2)	5(5)	1(1)	1(–)	—	—	—	—	—	2(–)	2(–)	2(1)	1(1)	16(10)
Fiji — Others	—	—	—	—	—	—	—	—	—	—	—	2(1)	—	2(1)
Fiji — Total	6(6)	8(8)	8(6)	7(–)	8(4)	4(1)	1(–)	1(–)	4(4)	15(1)	4(–)	10(2)	5(4)	81(35)
Tonga	1(1)	—	1(1)	—	—	—	—	1(–)	—	—	—	—	1(–)	4(–)
Western Samoa[e]	—	—	—	—	—	—	1(–)	—	—	—	—	—	1(–)	2(–)
Cook Islands	1(–)	—	—	—	—	—	—	—	—	—	—	—	—	1(–)
Niue	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nauru	—	—	—	—	—	—	—	—	—	—	—	—	—	—
American Samoa	—	—	—	—	—	1(–)	—	—	—	1(–)	—	—	—	2(–)
Trust Territory of the Pacific Islands	—	—	—	—	—	—	—	—	—	1(–)	—	—	—	1(–)
Solomon Islands	1(1)	—	—	—	—	2(–)	1(–)	—	—	—	—	—	—	4(1)
Gilbert and Ellice Islands[f]	—	1(1)	—	—	—	—	—	1(–)	—	—	1(–)	—	1(–)	4(1)
New Hebrides	—	—	—	—	—	—	—	—	1(1)	—	—	—	—	1(1)
Total	9(9)	9(9)	9(6)	7(–)	8(4)	7(1)	3(1)	3(1)	5(5)	17(1)	5(–)	10(2)	8(4)	100(40)

[a] Figures in brackets indicate the number of women students in the total.
[b] At the University of the South Pacific, Suva.
[c] AHI = Assistant health inspectors.
[d] RSH = Royal Society of Health (London) course.
[e] Now named Samoa.
[f] Now two separate entities: Gilbert Island and Tuvalu.

the option of private practice to Fiji graduates on completion of six years of satisfactory government service. A number of graduates have already availed themselves of this opportunity.

The classical lecture remains the standard method of teaching in the School, although the tutorial system has been introduced. Similarly, the use of audiovisual aids remains traditional and conservative. This does not imply that the School has not been following developments elsewhere in medical education and current knowledge has been incorporated into the teaching/learning processes in the training of health personnel. Innovative approaches, such as seminars and small group discussions, have already become standard practice.

Interdisciplinary teaching has not yet been developed, mainly because of staffing difficulties. The students are trained both to provide comprehensive patient care and to participate in the diagnosis and solution of community health problems.

A common core curriculum for different categories of health workers trained in the School has not yet been developed, although certain categories of health workers, for example, the medical assistants, physiotherapists, radiographers, dietitians and pharmacists, share basic sciences teaching programmes.

Postgraduate and continuing education

From 1959, the Fiji School of Medicine offered a six-month postgraduate course in public health. This was discontinued in 1961, when the University of Otago Medical School in Dunedin, New Zealand, started to admit graduates of the Fiji School of Medicine to the Diploma in Public Health course.

Today, graduates of the Fiji School of Medicine are admitted to postgraduate programmes in Australia and New Zealand in the various branches of surgery and medicine, radiology and clinical pathology, conducted under the auspices of the respective Royal Australasian Colleges in Australia and New Zealand. Its graduates are eligible to sit for the United States ECFMG examination and for the Foreign Practitioners Examination of the State of Victoria, Australia.

The Royal College of Obstetrics and Gynaecology in the United Kingdom, reflecting the decision of the General Medical Council of that country, has not recognized the Fiji qualification but New Zealand has set up courses for Diplomas of Obstetrics and Obstetrics and Gynaecology specifically to cater for graduates of Fiji wishing to specialize in this field.

Native Practitioners, a journal published for over a decade, had helped the earlier graduates of the Fiji School to maintain links with each other and at the same time had provided a means for its readers to acquire

further knowledge and to keep up with advances in medical science. Later, weekly broadcasts to assistant medical officers were introduced. Broadcast subjects ranged from clinical medicine to public health education and a transmission entitled "Question Time" was devoted to answering questions submitted by the medical officers. Both these early attempts at providing continuing education have been supplanted by the *Fiji Medical Journal*, published by the Fiji Medical Association.

In Fiji itself postgraduate medical training is available in a number of fields on an inservice basis. These range from general refresher courses in clinical subjects through special courses in medicine, surgery, obstetrics and gynaecology, anaesthesiology, ophthalmology, and leprosy and tuberculosis control.

General refresher courses last a minimum of one year and consist of attachment to specific hospital departments, the participants working under the supervision of the specialists in charge. No fees are charged and free single accommodation is available in exchange for duties performed by trainees. Special courses usually require at least one year but shorter courses may be specially arranged.

Student selection

In its early stages, the School selected the most intelligent youths for training as "Native Medical Practitioners." Subsequently, candidates were required to possess the school leaving certificate (requiring 8 years of schooling). When science was introduced into the secondary-school curriculum in 1952, they had to pass the Cambridge school certificate examination (11 years of schooling) including a pass in a science subject. In 1972, applicants were required to have passed the New Zealand university entrance examination in English, mathematics, chemistry, and physics or biology.

Mindful of its responsibility to the other countries and areas in the South Pacific, where primary and secondary education have not developed as rapidly, the Fiji School of Medicine is prepared to accept candidates from these countries with lower qualifications. Pre-entry classes are now conducted by the University of the South Pacific, at Suva.

All students must be sponsored by their governments or international agencies; private students are not admitted. Fees are based on estimated overall cost per student and are liable to adjustment from time to time. Students are expected to be in residence except by special permission of the Principal; this applies to students from Fiji and elsewhere enrolled in all courses (i.e., not only medical and dental).

Since 1971, the fees have amounted to Fiji $ 1250 per annum (US $ 1330). This covers tuition, board and lodging, medical care, basic textbooks and clothing, as well as duty travel.

STUDENT EVALUATION

Student evaluation techniques vary from year to year and from subject to subject and are dependent on the availability of teaching staff and the enthusiasm of individual teachers. In the first and fourth year of the programme, evaluation is done by continuous assessment; 60% of marks are awarded to course work and 40% to the end-of-year examination.

Examinations are usually of the written essay type or oral or both. In addition, clinical examinations are required in clinical subjects in the final year. The internal examiner is usually a tutor in the relevant discipline but since 1970 external examiners have been invited.

High drop-out and failure rates are features peculiar to the School; these are particularly marked in the second year, ranging from 25% to 65% between 1970 and 1975. Inadequate pre-entry preparation of students is considered an important cause. Other causes have included a few disciplinary problems, as well as students transferring to scholarships for study overseas in a regular degree programme. Students from areas with sparse medical personnel and facilities are encouraged to repeat course work and resit examinations if they fail, and often repeat several years before they finally qualify.

PERSONAL OBSERVATIONS

Medical education in Fiji has reached a crossroads. That its graduates during the ninety years of its history have played a vital role in bringing health care to the people has never been questioned. There are now over 300 graduates of the Fiji School of Medicine in active medical practice, serving a population of some 1 250 000 people scattered over 26 000 000 square kilometres of the Pacific Ocean. Similarly, the ability of its graduates to carry out duties expected of them has never been in doubt. Since the mid-1960s they have been referred to as medical officers and have been given duties which are identical to those of university graduates. It is equally true that their largely pragmatic training has been dictated by the exigencies of the health services as they exist, not only in Fiji, but also in the other Pacific countries.

Although graduates of the Fiji School of Medicine have been successful in obtaining advanced, postgraduate qualifications and have found senior employment in the health services, it is true that there is still a difference in the treatment accorded them by the government employing agencies with regard to remuneration. This is paradoxical since there is no differentiation in function between medical officers who are graduates of

the Fiji School of Medicine and those who have graduated from a university programme.

There is now a strong move for the School of Medicine to be incorporated into a university and for the School to award a degree. The pioneers of the School had always been wary of the School moving in this direction. Dr T. Clunie wrote in 1936:

> "... any raising of the status of diploma towards a European level would defeat the objects of the School both by encouraging graduates to demand a higher salary and by removing them from their place in their natural social environment. Therefore the retention of the diploma at its present level would seem to be fundamental to the purpose for which the School was erected; the safeguarding of this principle cannot be regarded as reflecting unfavourably either on staff or the students."[1]

Yet in 1966 Sir Charles Morris, in his *Report of the Higher Education Mission in the South Pacific*,[1] stated that "education work is becoming a little more advanced and comprehensive with every year that passes—and no one can doubt that in due time, and at the appropriate time for the circumstances and needs of the Region, it will become a full professional and graduate School of Medicine". A still later report, by Sir Norman Alexander on the University of the South Pacific, 1967,[1] suggested that there should be a number of semi-autonomous institutes within the framework of the University. These institutes, of which the Fiji School of Medicine would be one, would award diplomas or institute certificates. He further suggested a development in three phases at the end of which would be the full degree course with the aim of securing recognition for licence to practise overseas. Finally, a University of the South Pacific Commission on Medical Education in the South Pacific, headed by Professor Robin Irvine, in 1971,[1] recommended that the Fiji School of Medicine become the School of Health Sciences of the University; that the course be lengthened to six years; and finally that a two-year conversion be instituted for recent diploma holders.

In 1973, the University Senate of the University of the South Pacific resolved that it would consider sympathetically any request for recognition to be granted to Fiji School of Medicine qualifications but that the Fiji School of Medicine would have to satisfy the University of the South Pacific on the standard of its teaching programme. The Academic Board of the Fiji School of Medicine recommended the lengthening of the medical course by one year, almost as if it had considered such an outcome inevitable.

The question remains, however, whether this move should be effected. If graduates of the Fiji School of Medicine are discriminated against,

[1] See background documentation list on pages 84-85.

redress is within the power of the Government. It is the tradition of academic institutions to require the incorporation of academic material into the curriculum. In these days, when there is great concern with cost-effectiveness, cost-benefit and task-oriented objectives, any expenditure which cannot be directly translated into skills learned would be hard to justify. This would apply particularly to the Fiji School of Medicine because of its limited resources.

The medical profession has been caught up with overspecialization at the expense of universal coverage of health services. Time and time again, developing countries have expended valuable resources in establishing medical schools based on models from highly sophisticated and industralized countries. Even more unfortunately, occasionally these have been adopted wholesale with scant attention to the appropriateness of such training in relation to the existing health service infrastructure within which the graduates will practise. This dichotomy has arisen because traditionally the medical school, as part of a university, comes under the jurisdiction of the ministry of education while the health services are under the aegis of the ministry of health, and too often no common forum exists for these two branches of the national administration to work towards a common goal.

Ultimately the *raison d'être* of health personnel training is to fulfil the manpower needs of the health services. WHO has developed and expanded the health service manpower development philosophy. A few countries have already established national agencies to enable the health service and health manpower development branches to interact.

Fiji is already privileged to have this system, since both the Fiji School of Medicine and the health services come under the responsibility of the Permanent Secretary for Health. Much thought must be given to the implications should a decision be made to change the existing structure.

CHAPTER 6

THE MEDICAL UNIVERSITY OF PÉCS, HUNGARY: A COMMUNITY-ORIENTED MEDICAL EDUCATION PROGRAMME

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EDITORIAL NOTE

As a medical education programme supported and controlled by the Ministry of Health, the programme at Pécs illustrates some benefits of close coordination between those responsible for health services and medical educators. Medical educators are directly involved in the local health services; thus the relevance of the education for local health needs is more readily ensured and a variety of clinical experiences are available to students.

A major departure from the traditional curriculum was introduced in 1972. It attempted to integrate various subjects which were usually taught separately. A major and substantial course—social medicine—was introduced, and much less emphasis than is common in Hungary was given to the formal discourse by teachers as a means of encouraging learning.

The selection of students takes such factors as previous experience and commitment to health care into account and some 50% of applicants for admission are required to spend from one to three years in health care work prior to entry into the course.

Hungary is a relatively small country situated in both a geographic and historical sense at the confluence of contrasting streams of ethnic, religious, cultural and political concepts. Traditionally a meeting-place of diverse cultures, it became a socialist state in 1945 and since then has rapidly developed economically, culturally and politically from its former semi-feudal agricultural status.

The area of Hungary amounts to 93 000 square kilometres, with a population of 10.5 million in 1976; hence the density of population is relatively high—113 per square kilometre. As in many other countries, there has been an increase in the urban population, reflecting the change in the economy; in 1977, 51% of the population were living in cities of 20 000 inhabitants or more, compared with 40% in 1941.

HEALTH

The Ministry of Health is responsible for a comprehensive health service which is oriented to provide the population with the best possible health care. Although the service is centralized, it is locally administered in 19 counties, with 92 districts and 3183 communities. The service is staffed by health personnel employed by the State. There is no private service. The system is strongly oriented towards prevention and has a well-developed network of public hygiene and epidemiological services. The following health statistics give some indication of both the present health status and the effectiveness of the health service.

Life expectancy for males is 66.5 years and for females 72.4 years. In 1976 the infant mortality was 29.7 per 1000 live births, having decreased from 59 per 1000 in 1956. The number of hospital beds is 85.4 per

10 000 population. There are 28 000 physicians in the country—i.e., one doctor for every 375 persons. The major causes of death per 10 000 population are:

Cardiovascular diseases	28.5
Neoplastic diseases	24.0
Arteriosclerosis of brain	18.2
Hypertensive disease	6.2
Traffic and other accidents	5.7

In 1972, new legislation was passed which had as its objective to give all citizens free access to all health care facilities. To achieve this goal, the health service faced a difficult but inspiring challenge. This challenge is being met successfully; considerable progress has been and is still being made.

The Hungarian educational system is also under the control of the State. It is totally financed as a State responsibility and administered by the Ministry of Education. Universities are part of its charge, with a few exceptions, such as medical schools, which are the responsibility of the Ministry of Health. This separation from the Ministry of Education was introduced in 1951 to ensure that the training of physicians could be planned in an integrated manner with the health services. It also provided the opportunity for the medical universities to become more directly involved with service by taking over responsibility for local health clinics, hospitals, etc. The Ministry of Education continues to play an influential role through its overall responsibility for admissions, selection procedures, and generally in effecting a degree of quality control by determining standards to be reached. But it is the Ministry of Health which has primary control and which meets financial and other requirements.

There are now five medical universities, four of which, including the one at Pécs, provide training for physicians at both basic and post-graduate levels. The fifth, one of two situated in Budapest, offers post-graduate education only. The four others admit some 1100 students per year for undergraduate study.

When the Ministry of Health took control of the medical universities, it was possible to give the universities direct responsibility for some 50% of all clinical facilities, such as hospital beds, in the local districts; the other 50% of facilities in the community health system cater for the more specialized health care of the region and country and are also used for research.

Two-thirds of all medical research activities are carried out at the universities, supported by the Medical Research Council, the Hungarian Academy of Sciences and the pharmaceutical industry.

The present arrangements, i.e., the close association with the Ministry of Health, facilitate the achievement of the three major functions of the universities: teaching, service and research.

THE INSTITUTION

The Medical University of Pécs has its origins in the first Hungarian university, founded in 1367. It is situated in a small but active cultural and industrial centre of South Pannonia, which was established some 2000 years ago. As a separate university dedicated to the education of physicians, it is under the direction of a rector, appointed by the Government for a three-year period, with the possibility of extension for a further term. There are three vice-rectors responsible for teaching, clinical affairs, and research, respectively. The rector is assisted by a Senate of 56 members, whose power is advisory rather than executive. Two-thirds of the members of the Senate are professors and the remaining one-third represent the staff, students, and social organizations. There is also an executive committee, the Praesidium of the Senate, with 11 members.

The staff of the Medical University numbers 2500, 640 of whom are teachers. Of these, approximately 100 are basic scientists—biologists, physicists, chemists, engineers—and the rest are doctors of medicine.

The annual budget of the University is approximately US $ 10 million. This, together with new investments of some US $ 35 million in buildings and other facilities, makes it one of the most modern and best-equipped institutions in the country.

The total number of students is 1400, of whom 1300 are in the medical course and 100 are studying dentistry. About 10 % of the total student population are foreigners. Special dormitory accommodation is provided by the University for some 60% of its students.

Applications for admission outnumber the places available by 3 to 1. The selection of students to be admitted is considered to be extremely important and a number of criteria are applied. Initial consideration is given to:

(*a*) Performance in biology and physics in the third and fourth years of secondary school; and

(*b*) Performance in a nationwide standardized written and oral examination in biology and physics.

From those who meet the required standards, a further selection is carried out, note being taken of:

(*c*) Social background of applicants—preference is given to students whose parents are employed as industrial workers or farm labourers;

(*d*) Past experience or involvement in health care—preference is given to applicants who have been nurses, ambulance workers, health technicians, etc.;

(*e*) Aptitude for health care—an assessment is made of the aptitude of applicants for the medical profession by means of an intensive interview conducted by a committee consisting of practising doctors, staff members of the University and secondary-school teachers; and

(*f*) Place of origin—preference is given to students from districts at present relatively poorly supplied with medical services.

These various criteria are used to rank students into a priority order. Of those judged to be suitable candidates, the top 50% are admitted immediately; the rest are given a place conditional on the fulfilment of a requirement to work in a health occupation (such as nursing) for a period varying from one to three years.

The selection process has been found to be effective, as reflected in the quality of the students in training and the low drop-out rate during the six years of studies, which amounts to not more than 10-15% of the initial intake.

GUIDING PRINCIPLES OF THE PÉCS PROGRAMME

The rapid development of the medical sciences has produced an exponentially increasing amount of knowledge of concern to the physician. It is clearly impossible for any person, whether student or practitioner, to memorize all available data. It therefore follows that a careful selection of the information or knowledge to be acquired by the student has to be made. In selecting essential knowledge that all students and practitioners need to acquire, the following principles are applied:

(*a*) Only those aspects of the basic sciences—chemistry, biometrics, biophysics, biochemistry, etc.—which are fundamental principles rather than applications should be considered for inclusion in the programme; these basic principles provide the scientific basis for continuing lifelong learning, and hence are essential requirements;

(*b*) Students should acquire the knowledge and skills essential for general practice as well as for later specialization; and

(*c*) Students should develop the motivation and skill to solve problems and the ability to adapt to changing conditions; these attributes are basic prerequisites for the continuing learning necessary in their future professional lives.

In identifying the essential content and process of the programme, an important contributory factor was the resolution of the Hungarian Government relating to the national education situation. The recommen-

dations inherent in this resolution were considered in a series of consultations by a group of professors, staff members and students who developed the new programme at Pécs in September 1972. Subsequently, planning of the whole programme was completed in 1975.

Essentially, the programme seeks to educate a community-oriented general practitioner. Given this general orientation, a trainee is seen to require a commitment to his role as a member of his society, and an understanding of political and social ideology, which in turn will be reflected in his active participation in community affairs. Far from being an isolated worker in health care, he must see his role as serving the community, being part of it, and being committed to its improvement.

OUTLINE OF THE COURSE

To meet the requirement of developing a socially committed physician, a new course was introduced early in the first year entitled "Introduction to social medicine". This course seeks to give the student a historical background of medicine and an understanding of the sociological and psychological aspects of the profession, thus strengthening his community-oriented attitude. All such subjects as hygiene, epidemiology, forensic medicine, sociology, occupational health, health administration, history, philosophy, and political economy are integrated in this major subject. Social medicine and the more traditional basic science subjects are intended to provide the future general practitioner with both a theoretical and a practical introduction to medicine and the basic sciences.

With the realization that the traditional differences between scientific disciplines are dysfunctional, considerable attention has been focused on the development of interdisciplinary approaches. The most important integrated learning experiences are provided in a course organized around basic human functions. In these so-called "blocks", the traditional disciplines can make a contribution to the acquisition of necessary knowledge by developing, in an integrated fashion, an understanding of the basic principles involved.

Given the need for an integrated and theme-oriented rather than a subject-oriented approach, the structure of the University had to be reorganized. As well as the traditional departments, the University has established interdisciplinary groups of professors and associate professors from different departments. These, under the leadership of specialists most qualified in the specific subject area, have common educational and scientific tasks which transcend the classical disciplines. However, because the departments have a long tradition and a degree of financial independence, they continue to operate as units responsible for a specific discipline, particularly in relation to national and international contacts.

In order to encourage the student to take responsibility for his own education both at present and in the future, it is necessary to instil a spirit of inquiry rather than a passive reliance on memory. Students are expected to keep abreast with new methodology and to be able to apply new procedures and techniques logically and dialectically; for instance, the physician of today must know how to use computers and other equipment. Since clinical diagnosis and therapeutic management are likely to change in the next few decades, the student needs to develop a problem-solving and inquiry approach. To do so, he or she needs to have experience in meeting new challenges, new problem situations. In the theoretical and laboratory work in the basic subjects, students are hence required not only to learn the skill of using physical, chemical and electronic equipment but also to understand the theory of it. For example, in the biometry course, students are expected to learn how to use different types of computers as well as how to plan, programme and evaluate experiments.

An important contribution to the development of a spirit of inquiry as a basis for continuing education is the requirement for students to prepare a thesis. During the fourth year, all students select a study theme in consultation with the head of the social medicine block. This thesis has to be submitted within two years and requires independent research work involving literature surveys and the collection and evaluation of statistical or experimental data. The thesis has to be defended by the student before a committee of specialists, on the occasion of the State examination in medicine. Most students are enthusiastic about this experience and the subject specialists have commented on the high scientific value of many of their efforts.

Traditionally, the Hungarian medical schools followed the programme and procedures of the well-known German and Viennese schools, where professional lectures formed the most important learning experiences for students. In Pécs, prior to the introduction of the new system, the proportion of lectures to practical classes was 60%:40%. This has been reversed; the proportion is now 40%:60%. There is, however, still a reliance on lectures by the most outstanding professors because these are viewed as providing valuable learning experiences. It is possible to communicate to students a synthesis of knowledge by means of lectures, and the professors themselves provide models likely to influence the development of appropriate attitudes. It should be noted, however, that the 40% of formal classroom instruction does not only mean classical lectures, it also includes other educational experiences in which the whole class (some 250 students) participates. Thus, apart from a discourse by a professor, these classes often take the form of demonstrations, clinical-pathological roundtable conferences, or the viewing of films.

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The increase in the time allocated to practical classes, including laboratory work, has meant that the requirement for laboratory space and equipment and for opportunity for patient contact during the clinical period has been increased. These requirements are partly dependent on additional finance but the need for increased patient contact meant the introduction of a new system of teaching hospitals. On the basis that the optimum student/patient ratio is 1:12-15, some 7000-8000 hospital beds were needed to meet the requirements of 600 students in the fourth, fifth and sixth years. Six district hospitals were therefore designated as teaching hospitals. These hospitals have certain advantages in comparison to other hospitals—namely, that the directors and most of the chief physicians receive positions in the University and have better working conditions. The availability of such teaching hospitals has also permitted much better integration of practice and theory than hitherto.

Immediately following the study of the clinical block, students carry out practical studies in the teaching hospitals. In such a system, where practice is part of the course, it has been possible to abolish the one-year internship. Students are required to pass an examination after the theoretical instruction and then take a combined examination of theory and practice after completing practical study in the hospital.

It should be noted that not only are the theory and practice of clinical medicine integrated but, similarly, social medicine involves clerkships with general practitioners, practical work in polyclinics and in other health administration centres, as well as health centres in factories and farms.

The examination of student performance is used not only to check on the progress of each student but also to evaluate the effectiveness of the teaching procedure. To meet this objective, experimental and developmental work in education is necessary and has led to the establishment of a special unit in didactics and teaching. This unit, staffed by educators, psychologists, engineers, and mathematicians, has the task of improving the education programme and of preparing, analysing and interpreting examinations, particularly written tests. The unit is also responsible for assisting the staff in using films, colour television, tapes and tape-slide programmes for instruction, and for the promotion of technical aids in the teaching/learning process.

With respect to examinations, it has to be admitted that, although a lot of effort has been expended, there is still much to be done to improve the harmony between teaching and examining.

The basic principle guiding the planning and implementation of the programme is the need for integration. In applying this principle, a number of problems have been encountered. Thus, it was found that in some subjects it proved more advantageous to retain a discipline

orientation because of the internal logic of the subject. For example, biophysics, chemistry, biochemistry, microbiology, cytology, and pathological anatomy were found to be more easily taught as distinct subjects. Though separate subjects, they are, however, carefully fitted into the overall programme and support each other in a coordinated manner. The ratio of integrated subjects to nonintegrated subjects is approximately 60% : 40%.

The curriculum

The overall curriculum is divided into two parts: a preclinical period during the first to third years, which is concerned with the basic scientific, biological and social foundations of medicine, and a second part, during the fourth to sixth years, consisting of social and clinical medicine.

More specifically, in the first year the students are required to study the basic principles of biology, involving the study in a coordinated manner of biophysics, biometry, chemistry, biochemistry, cell biology, and anatomy. In addition there is an introductory course—social medicine—which, as mentioned above, is an integrated course. Students are also required to study political economy and a foreign language, and engage in gymnastics and sports (see Table 1).

TABLE 1. CURRICULUM UNITS

Theoretical	Clinical
1. Anatomy and histology	1. Anaesthesiology
2. Biochemistry	2. Dermatology
3. Biology	3. Clinical central laboratory
4. Biophysics	4. Internal medicine clinics I and II
5. Chemistry	5. Gynaecology and obstetrics
6. Experimental surgery	6. Neurology, psychiatry and neurosurgery
7. Forensic medicine	7. Ophthalmology
8. Hygiene	8. Otorhinolaryngology
9. Microbiology	9. Orthopaedics
10. Pathological anatomy	10. Paediatrics
11. Pathological physiology	11. Polyclinics
12. Physiology	12. Radiology
13. Pharmacology	13. Surgery I and II
14. Social medicine	14. Traumatology
15. Theoretical central laboratory	15. Urology

Gymnastics and sport
A foreign language
Marxism-Leninism
Teaching techniques and didactics
Zootechnics

In the second year, the student studies normal physiological functions. As mentioned above, this is presented in an integrated form with nine major blocks, details of which are presented in Table 2. Practical experience and laboratory work in anatomy is a separate part of the course

but is coordinated with the theoretical studies. At the end of the second year, the student has to pass a written examination as well as an oral and practical test, the latter to assess his achievement of laboratory skills.

TABLE 2. INTEGRATED PROGRAMME OF THE SECOND YEAR

	Blocks	Number of hours	
		Theoretical	Practical
First semester	1. Internal regulation of the organism	15	210
	2. Energy production and regulation	55	
	3. Transport across membranes	25	
	4. Gas exchange, respiration	10	
	5. Secretion	15	
Second semester	6. Reproduction	20	238
	7. Endocrine regulation	20	
	8. Nervous system regulation	76	
	9. Psychophysiology	20	
	Total	256	448

In the third year, the main task of the student is to acquire an understanding of the general principles of pathological functions (see Table 3). He also receives instruction in an introductory course of clinical studies. This involves the study of general pathophysiology, pathological anatomy and microbiology, which are taught as separate disciplines but in a coordinated manner until the end of the fifth semester. In the final semester of the third year these subjects are presented in an integrated fashion in what is called theme-oriented blocks. The foundation for primary care—that is, the knowledge and skills necessary for non-specialist care—are presented to the students in a block entitled "introductory surgery and first aid".

TABLE 3. THE PROGRAMME OF THE THIRD YEAR (5TH AND 6TH SEMESTERS)

Disciplines	Hours of theory	Hours of practice
1. Microbiology	64	64
2. Pathological anatomy	48	64
3. Pathological physiology	28	—
4. Pharmacology	48	—
5. Philosophy	32	—
6. A foreign language	32	—
7. Physical education	—	32
Total	252	160

TABLE 3 (continued)

Blocks	Hours of theory and practice combined		
Pathology and diagnostics of:			
1. Respiratory system		60	
2. Cardiovascular diseases		90	
3. Gastrointestinal system		90	
4. Urinary tract		60	
5. Blood		60	
6. Internal secretion		30	
7. Nervous system		30	
8. Brain		30	
Nonintegrated disciplines	**Hours of theory**		**Hours of practice**
1. Pharmacology	30		30
2. Introduction to internal medicine	—		30
3. Introduction to surgery and first aid	36		28
4. Ethics	30		—
5. A foreign language	30		—
Total	126	240	214

During the fourth, fifth and sixth years the programme consists basically of studies of social and clinical medicine (see Table 4). In each of the blocks there are two constituents, social medicine and clinical medicine.

TABLE 4. INTEGRATED BLOCKS OF SOCIAL AND CLINICAL MEDICINE, FOURTH TO SIXTH YEARS

	Hours		
	Clinical	Social	Clerkship
1. Physicochemical pathogenesis and communicable diseases	72	44	252
2. Allergy/metabolism	46	6	
3. Endocrine diseases	70	—	
4. Cardiovascular diseases	61	9	326
5. Respiratory diseases	44	13	
6. Gynaecology and family health	39	11	
7. Gastroenterology	57	4	288
8. Diseases of the liver and pancreas	38	2	
9. Oncology	23	8	
10. Neurology	46	—	
11. Psychiatry	30	20	
12. Neonatology	27	18	
Total	553	135	866

Within these blocks, the students' studies are the responsibility of the different clinical departments and hence the student comes into contact with the best specialists available. The teaching/learning process in these blocks has two aspects. First, there are lectures and demonstrations for all students, presented at the University or in allied institutions. Secondly, there are clerkships with bedside teaching in different clinical settings including teaching hospitals, in small groups of 3-5 students. In the sixth

year there are additional practical periods between the teaching blocks, ending in the final semester with an obligatory clerkship of three months in an area selected by the student. This option assists the student in preparing for his future endeavours. During these years, there are, in addition, studies of several subjects not included in the integrated programme (see Table 5).

TABLE 5. NONINTEGRATED DISCIPLINES OF THE FOURTH TO SIXTH YEARS

Discipline	Hours	
	Theoretical	Clerkship
1. Surgery	18	36
2. Otorhinolaryngology	11	30
3. Stomatology	10	12
4. Kidney diseases	55	144
5. Urology	15	
6. Haematology	58	
7. Orthopaedics and traumatology	39	48
8. Ophthalmology	15	12
9. Dermatology and venereology	23	30
Total	244	312

An assessment of student performance, in terms of both theoretical knowledge and performance skills, is made at the end of each block and of each separate subject studied. Finally, the students' knowledge and skills are assessed in a general terminal examination which covers both social and clinical medicine. This consists of oral and practical examinations conducted by a committee composed of senior representatives of the University, the teaching hospitals and the community health care system.

ASSESSMENT OF THE PROGRAMME

Unfortunately, there has been no detailed evaluation of the system as it operates and, because the first graduates are only now entering the profession, it is impossible to judge the course by the performance of its graduates. Hence, it is not yet possible to assess the work of the programme in terms of how its products meet the requirements for health care in the community. Some attempts have, however, been made to assess the effectiveness of the programme by examining the performance of students. There are also some comparative data available from a national assessment made by the Ministry of Health in which all students in the four Hungarian medical universities that provide undergraduate education were examined during their fifth year. In this examination,

consisting of 200 questions, the students at Pécs certainly performed as well, if not better, than students at the other universities.

Less objective evidence is available from the observations of senior staff of the health care system, who have commented favourably on the performance of students both in examinations and in practice. Their performance has been particularly commended by the physicians in teaching hospitals, who unanimously have reported considerable improvement in knowledge, skills and attitudes of present students compared with those who followed the traditional programme of studies.

From the consumer's point of view, it would appear that students are favourably disposed to the present programme. On numerous occasions, they have expressed satisfaction with the degree of independence in their learning activities and in their practical work, both in the laboratory and in patient care. They have also expressed satisfaction at the diversity of the clinical experience available through contact with a large number of patients.

Because the programme is still relatively new a more complete and impartial evaluation of it is not yet possible. At present there is at least partial evidence to support a preliminary positive judgement as to the successful achievement of its objectives.

PERSONAL OBSERVATIONS

It is obvious that much yet needs to be done. No programme can ever be said to be perfect. It is necessary constantly to seek ways to improve.

The present programme is still in a state of metamorphosis and hence all judgemental statements have to be made in a dialectic manner. It is also noteworthy that the introduction of the new type of programme, which in many ways departs radically from well-established traditional forms of medical education, had to overcome a series of obstacles, not least because of the opposition from conservative elements of the staff. This was particularly evident in the opposition of disciplinary experts to changes involving the integration of subjects previously taught as distinct courses. Only too frequently the argument was put forward that "integration reduces the high standard of knowledge". It was argued further that integration would reduce the knowledge of important aspects of the subject, especially as the amount of data to be memorized by the student was drastically reduced. While it may be understandable that experts in a particular field would express such fears, it is perhaps more surprising that, initially, a number of students expressed similar conservative views. Although this opposition has been steadily reduced, there is still a small group of teachers who are not at all convinced about the benefits of the new approach.

Another problem that had to be overcome was that the introduction of a new approach to learning and teaching often required expensive facilities. There was a need for more laboratories, more teachers, and more technical aids. These facilities were obtained, but during the initial introductory period of three to five years there were difficulties and the success of the programme depended on the enthusiasm of teachers and administrators who were willing to accept the challenge and to overcome the problems associated with introducing a new programme.

Since any education programme must be relevant to the society of which it forms a part, it is not possible to import or to use as models programmes from other settings. In that sense the introduction of the new programme at Pécs must be viewed as an experiment and, like all experiments, it is important not to change too many conditions during its innovative phase. Change is always necessary but there is also need for a period of stabilization.

To summarize, the realization that there is what might be called an explosion of knowledge in medicine, that there is a need to provide physicians oriented to community care, and that there is need for constant adaptation to new conditions has led to the development of a new programme in medical education at Pécs. Since 1972, this new programme has attempted to introduce integration of subject matter where this was deemed necessary and feasible; it has given attention to developing in students the necessary knowledge and attitudes of the social sciences; it has diversified the practical experiences of students in clinical and laboratory areas; and it has attempted to change the teaching/learning process so that the student is more active in his own education.

CHAPTER 7

UNIVERSITY CENTER FOR HEALTH SCIENCES, BEN GURION UNIVERSITY OF THE NEGEV, BEERSHEVA, ISRAEL:

AN INTERIM PERSPECTIVE

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EDITORIAL NOTE

The Ben Gurion University Medical School, established in 1974, has three major goals. The first seeks to develop an integrated programme for delivery of preventive, curative and rehabilitative care to the total population of a defined region. The second envisages the merging of this integrated health care system with the University Center for Health Sciences under a single authority. The third goal is to educate, in this new framework, a different type of physician whose primary objective will be to provide service in an integrated hospital/community health care system.

The commitment to achieve an integrated health service and manpower development programme is a most important innovation, which should not only result in a more relevant education of health personnel but also stimulate more effective planning and implementation of the health service.

The curriculum and the teaching/learning process are designed to reflect the three major institutional goals. Both in planning the content of the programme and in the teaching/learning process, attention has been focused on problem-solving, integration, sequencing, and the specification of necessary competencies derived from an analysis of tasks or functions.

The Ben Gurion experience sheds valuable light on how a programme can be planned and implemented with these principles in mind. It also provides significant information on the difficulties encountered and how at least some of these have been overcome. Careful attention is given to ensure effective interrelationship between institutional goals, content and process of instruction and evaluation.

The Government of Israel authorized the establishment of the University Center for Health Sciences at the Ben Gurion University of the Negev in Beersheva in 1973. A school of medicine, the first component of the Center, was opened in 1974 with a class of 34 students.

Since its inception, the medical school, through its programmes in education, service and research, has assumed a major commitment in addressing itself to the problems of health care delivery of Israel in general and of the Negev region in particular. Indeed, the decision to establish a fourth medical school in a country of approximately three and a half million inhabitants was predicated on the assumption that the School's programme of studies would be responsive to the national needs in health care and that it would play an active role in improving the health care system. The merging of medical education and medical care was, therefore, a basic principle upon which the school was founded.[1]

The distribution of specialists and primary care physicians in Israel follows a two-tier pattern. Graduates of Israeli medical schools tend to select careers in specialty medicine and to cluster around the academic

[1] PRYWES, M. Merging medical education and medical care, *The hospital medical staff*, 2 : 26-33 (1973).

medical centres and their affiliated hospitals. To the extent that career choice is influenced by experience during medical studies, this is to be expected. Students spend their undergraduate and postgraduate years almost exclusively within the confines of the medical centre with little opportunity to confront the realities of delivering health care in the community. It is therefore natural that they follow in the steps of their role models and enter the fields of specialty medicine.

Primary care, on the other hand, is usually provided by immigrant physicians, whose standards of training are more variable than those of Israeli graduates and who generally have not been specifically prepared for this type of practice. For the most part primary care physicians work in relative isolation from the medical centres and their functions often follow a routine pattern. Under these circumstances, it is not surprising that there is a continuing shortage of adequately trained physicians in the urban and rural ambulatory care clinics while the pool of hospital-based specialists steadily rises. The challenge facing medical education in Israel is therefore not one of numbers alone. Rather, it involves the kinds of physicians to be trained if the various health needs of the country are to be met.

There is a sharp demarcation and minimal interaction between the primary care sector and facilities for secondary and tertiary care. Preventive and curative medicine are delivered separately under different administrative authorities. Lack of coordination and overlapping responsibilities among governmental agencies, the health insurance system, and voluntary institutions make continuity in the delivery of health care difficult to achieve. Integration of services is therefore of high priority in efforts to improve the health care system.

GOALS AND RESOURCES

The response of the School of Medicine at the Ben Gurion University of the Negev to these problems of physician training and health care delivery is embodied in its three distinctive goals. The first seeks to develop and implement an integrated programme for delivery of preventive, curative and rehabilitative care to the total population of a defined region. The second envisages the merging of this integrated health care system with the University Center for Health Sciences under a single authority. The third goal is to educate in this new framework a different type of physician whose primary objective will be to provide service in an integrated hospital/community health care system.

Integration of services

The goal of an integrated programme for the delivery of comprehensive care recognizes that improvement in the level of health care requires better coordination and more efficient use of the regional resources available. The extent to which this goal can be achieved will be influenced by the geographic and social characteristics of the Negev region, as well as by the particular constellation of health agencies which are active in the area.

The Negev is the southern part of Israel forming a triangle with its south apex at the town of Elat. It is a semi-arid desert of 14 109 square kilometres and constitutes 60% of the country's land mass. The population of the region in 1975 was close to 400 000, consisting mainly of new immigrants from Europe, North Africa, and North and South America, as well as some 47 000 nomad bedouin. The median age was 19 years. While the economy of the area is based mainly on agriculture, there is increasing industrial development in the production of textiles, petrochemicals, potash, copper and glass. The principal city of Beersheva has a population of 135 000.

Nearly all of the health services in the Negev are provided by two agencies: the Workers' Sick Fund of the General Labor Federation (Kupat Holim) and the Ministry of Health. Kupat Holim is both the insurance carrier and provider of community- and hospital-based curative services for over 90% of the population in the Negev. In addition to the Soroka Medical Center in Beersheva with 700 beds and the Josephthal Hospital in Elat with 64 beds, it operates a network of some 134 urban and rural ambulatory care clinics. The Ministry of Health maintains the 311-bed Barzelai Hospital in Ashkelon and is responsible for providing preventive services throughout the region. The division of functions between the two agencies, however, is not always clear. There is often overlap and duplication. In addition, supplementary specialized health-related facilities are operated by other branches of the Government and by several voluntary organizations. To achieve the goal of integrating health care, a consortium has been established to encourage and facilitate more effective communication among the agencies concerned and provide a framework for coordination of services and sharing of resources.

Merging of care and education

The goal of merging medical care and medical education under a single authority has several dimensions. Firstly, it implies a potential impact of the medical school on the quality of care through direct involvement in modifying the system for delivery of health services in the Negev. Traditionally, health manpower training and health services delivery have

tended to move in separate orbits. More recently, there has been a trend towards the establishment of collaborative arrangements that enable the resources of medical schools to be utilized to explore new patterns of health care delivery.

Rarely has a medical school participated in the planning and implementation of all levels of health services for an entire region. This is the intent in Beersheva, which, in the context of the Negev, implies involving in the educational process not only a major teaching hospital but all sectors of the health care system including the peripheral ambulatory services in the rural and developing areas.

There is a second dimension to this goal. Within the collaborative framework engendered by a single authority, it will be possible to examine the role of the physician in different health care settings in terms of the competencies required for professional performance. Educational objectives for the medical school derived from the real world of professional practice can then be formulated.

Of perhaps greater significance is the potential to bring about changes in the role of the physician within the system. The linking of the educational programme to all components of the health care delivery system will both stimulate and reflect changes in the patterns of health services. It is the opportunity for decisive involvement in determining the roles and responsibilities for which the school is to prepare students which will characterize the interface between medical education and medical care in Beersheva. If successful, it may give rise to a new consonance between the process of medical education and the full range of the community's health needs.

Orientation of curriculum

The third goal concerns the orientation of studies at the medical school. The commitment is to educate physicians whose primary objective will be to provide medical service in a combined hospital-community system. This commitment implies that along with the basic elements of medical education the primary care dimension of medical practice will receive an emphasis which in other medical schools is usually accorded to specialty medicine. Two consequences are anticipated. Firstly, a significant proportion of students will be attracted to careers in primary care. Secondly, all students, whatever their eventual career choices, will have acquired sensitivity to the primary care dimension of all types of medical practice as well as basic competencies in this domain.

Available to the medical school in developing and implementing this type of curriculum are the resources of the regional health care system and those of the Ben Gurion University of the Negev. Progress in achieving the first two goals as they relate to changes in the organization of

health services is a prerequisite to meeting the educational objectives. Existing barriers which separate the hospital from community health clinics and preventive services from curative and rehabilitative care must be breached, not only to revitalize and improve the quality of care, but also to provide the range of learning experiences which are essential for the education of a new type of physician.

ISSUES AND RESPONSES

The curriculum in Beersheva is designed to reflect the three major institutional goals. In the process of curriculum development, however, these are considered in the wider context of issues which confront medical education throughout the world today. Among the issues which have been of particular concern are:

(*a*) The changing role of the physician and its educational implications;
(*b*) The effect of the information explosion on the curriculum;
(*c*) The question of relevance in medical education;
(*d*) The introduction and sustaining of curricular change; and
(*e*) Assessment of the impact of medical studies.

The changing role of the physician

The role of the physician in society has not escaped the impact of social and technological change which characterizes the 20th century. As epidemic diseases recede, chronic disabling conditions emerge as the major health problem. Adequate control often requires intervention by different categories of professional health personnel over long periods of time and involves considerations related to the quality of life as well as to its prolongation. Technological advances have made available methods of intervention which are more effective but which are costlier and tend to be fragmented and depersonalized. Public reaction, in turn, leads to pressure for change in the health care system to counter these tendencies.

In the course of such changes, the role of the physician may undergo modification. There is increasing emphasis on the responsibility of the physician for integrating and assuring continuity of care through the various phases of illness and on developing programmes to serve the needs of the population that are less effectively satisfied within the confines of traditional medical care settings. Concomitantly, responsibility for certain tasks traditionally performed by physicians may be assumed by new categories of health personnel.

In Beersheva, for purposes of initial curriculum development, the role of the physician in primary care is taken to include: facilitating entry of

the patient into the health care system; providing preventive personal health care services; integrating and assuring continuity of care through the various phases of illness, and participating in programmes wide in scope to serve the broader health needs of the population. The competencies required to meet responsibilities in each area have been identified and provide criteria for establishing and ordering educational objectives. Included are skills in fields not generally represented in medical school curricula, such as health education, management of health services and health care evaluation.

Following delineation of these competencies, a frame of reference for integrating knowledge, skills and attitudes related to primary care was developed. This was based on the natural history of disease concept. As used for curriculum planning in Beersheva, it refers to a temporal continuum in the evolution of disability resulting from the disease process. Points along the time axis can be identified at which intervention may (*a*) prevent the onset of the pathogenic process, (*b*) reverse the pathogenic process or decrease its rate of progression, and (*c*) reduce personal and social disability caused by the disease process.

A significant segment of the clinical and public health experience during the first two years of the course is organized according to the natural history of disease model. Students participate in activities related to primary and secondary prevention, intensive care and rehabilitation in a wide range of health facilities. Concomitantly, they acquire the knowledge base in the basic sciences as related to successive stages in the natural history of disease. In the subsequent integrated organ system modules each pathological condition is considered in terms of its natural history with appropriate emphasis on points at which primary or secondary prevention is feasible. The nature of the rehabilitative process receives special attention when it is this phase of the natural history which will require considerable intervention by the physician. The clerkships and field placements will be conducted at a wide range of health care facilities, enabling students to acquire competencies which relate to each phase of the natural history of disease. The facilities include primary care clinics, hospital wards and outpatient services, rehabilitation facilities, public health settings and occupational health clinics. Judicious sequencing of these experiences encourages a perspective which emphasizes the intellectual challenge and opportunities for service associated with the primary care dimension of successive stages in the natural history of disease.

The information explosion in medicine

A basic issue in medical education relates to the scope of the curriculum and the relative weight allocated to its various components. While the

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number of years reserved for undergraduate medical study has remained relatively constant, the rate at which new knowledge accumulates in the basic sciences and the clinical fields is increasing rapidly. The resulting pressures towards ever-increasing specialization give rise to new demands for representation in a curriculum which is already limited by constraints of time. Often the problem is resolved arbitrarily. The outcome is determined by the particular constellation of faculty interests interacting with the power structure of the institution. A more rational approach involves setting criteria for deciding what to incorporate in the curriculum. There are both qualitative and quantitative dimensions to these decisions affecting the depth as well as the breadth of teaching in each facet of the programme. Beyond these considerations of curriculum content, there is a need to pay attention to the nature of the learning process itself as a means for preparing students to adapt to the constantly changing technological and social basis of medical practice.

The process of curriculum development in Beersheva requires that decisions concerning each area of study be made according to explicit criteria. These are expressed in terms of instructional objectives which define the outcome of student learning in terms of competencies to be acquired. Specification of objectives constitutes the basis for delineating course content and allocating resources, including curriculum time. Methods of teaching and evaluation are selected in relation to objectives. This approach tends to diminish any arbitrariness in choice of method.

Since the programme of studies is designed to facilitate achievement of competency-based objectives, the way in which these are derived assumes considerable importance. The approach adopted in Beersheva is to base the competencies expected of students on those required by the practitioner. The framework for developing objectives is the analysis of physician performance. The implications are far-reaching. Priority is assigned to acquisition of knowledge and skills needed in the practice of medicine. In this context, the practice of medicine refers not only to those responsibilities which physicians assume within current modalities of health care delivery, but also to those which can be projected into the future. Of no less concern than technical competencies are the values which will guide students in applying knowledge and skills. These are equally amenable to performance analysis, which can contribute to defining attitudinal objectives rooted in the reality of medical practice.

Competency-oriented objectives constitute the main thrust of Beersheva's response to the problems of sampling posed by the information explosion in medicine. Once professional competencies have been identified, they are ranked according to priority in the practice of medicine. Those considered essential are included in the core component of the curriculum. Students are expected to acquire a specified level of profi-

ciency in the core competencies. Teachers are held accountable for achieving this outcome, and curriculum time and other instructional resources are allocated accordingly. This approach is responsive to student needs as currently perceived. It does not, however, by itself prepare graduates who will be able to cope in the future with the rapidly changing scientific basis of medical practice.

Undergraduate medical education is but the first phase of a lifelong process of continuing education for the physician. Study habits and patterns of reasoning are important determinants of the future practitioner's ability to adapt to new circumstances and problems. Concern in Beersheva with these dimensions of the educational process has had several significant consequences. Developing capabilities for self-evaluation and self-education have been designated as objectives common to all portions of the curriculum. The evaluation system provides continuous opportunities for self-assessment by the student supported by resources for remedial intervention. Individual initiative is thereby encouraged and reliance on external sources of motivation is minimized. In selecting methods of teaching, those fostering independent learning styles are emphasized.

Another related objective which transcends divisions within the curriculum is the development of problem-solving skills. These involve application of the following sequence of procedures: (*a*) problem identification and formulation of objectives; (*b*) selection of modality of intervention from among possible alternatives; (*c*) implementation of the intervention selected; and (*d*) evaluation of outcome in terms of objectives and unplanned consequences.

While this approach is central to clinical studies, it also impinges on the teaching of basic sciences by shifting emphasis from the cultivation of recall skills to the development of independent and creative thinking. In all components of the curriculum, it provides criteria for sequencing the acquisition of competencies, with those related to problem definition and setting of objectives preceding those concerned with methods of implementation.

Relevance in medical education

The widespread debate in recent years on the issue of relevance in medical education has challenged the traditional curriculum structure as being inadequately responsive to the learning needs of students. Although at times more rhetorical than reflective, this debate has stimulated reassessment of the educational process in undergraduate medical studies in terms of student perceptions as well as those of the administration and the teaching staff.

The spiral concept of curriculum adopted in Beersheva is based on the premise that learning and retention of knowledge occur most effectively when reinforced concurrently across diverse components of the curriculum and longitudinally over successive phases of the programme of studies. Three principal curricular components are delineated: basic sciences, personal health care, and public health. Instruction in each component begins in the first year and continues at successive levels of sophistication through to the end of studies. From the outset, appropriate experience in clinical and public health settings is interwoven with acquisition of a knowledge base in the natural and medical sciences. Teaching is integrated both horizontally, among subject areas within a particular phase of the curriculum, and vertically, among subject areas over successive phases.

The emphasis on problem-solving calls for considerable interdisciplinary learning. It is postulated that this occurs optimally after students have acquired a basic foundation in each of the relevant disciplines. This implies a sequencing pattern in which relatively short introductory courses in the various disciplines appropriate to each phase of the curriculum precede blocks of problem-centred interdisciplinary teaching. These courses enable students to acquire the essential vocabulary, basic concepts and principles as well as the methodological tools of the respective disciplines before proceeding to their integration.

Sequencing of components of the curriculum is generally guided by the principle that the knowledge base underlying clinical or public health measures should be acquired prior to experience in their application. At times, however, an approach more akin to the discovery method is used. Students are exposed to situations in which questions arise for which they have not been prepared in terms of theoretical background. The premise is that under circumstances in which questions arise out of personal experience, students will use their initiative in seeking answers. Resources for this purpose, including formal instruction, informal access to teachers, and bibliographic facilities are made available. This approach, introduced early in the curriculum, seeks to channel experiential sources of student motivation into the development of patterns of independent study.

The clarity with which expectations related to academic performance are communicated to students is an important determinant of how they distribute their time and effort. Often considerable student effort is misdirected because of lack of understanding of what is expected. The process of curriculum development in Beersheva requires that units of instruction should be prepared for each subject area, clinical clerkship or field assignment. These include explicit competency-based objectives.

For any given unit of instruction, the range of competencies which might be expected of students generally exceeds that which can be learned

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within existing time constraints. Each objective is therefore classified as essential or elective in terms of the extent to which it constitutes a prerequisite for ultimate physician performance or for a subsequent component of the curriculum. All students are expected to meet the objectives classified as essential, which serve as the basis for test items sampled in certifying examinations. Students are free to attempt the elective objectives, which are provided for the purpose of guidance only, as a function of individual choice. These procedures are designed to communicate academic expectations in a manner which enables students to make rational decisions concerning allocation of learning effort.

It is recognized that these various measures to increase student perception of the curriculum as relevant to their learning needs are taken on *a priori* grounds. They require validation through examination of their consequences in actual practice. To this end, the evaluation system at the medical school provides for collaborative review of each segment of the curriculum by students, teachers, and members of the curriculum development unit. The review is based both on learning outcomes related to the specified objectives, as measured by examination, and analysis of the teaching process, as perceived by both students and instructors. After each review, steps are recommended which might be taken to improve instruction and these suggestions serve as a basis for course revision.

Introducing and sustaining curricular change

The first three years of experience in Beersheva provide the case history of an attempt to introduce innovation in medical education under circumstances characterized by meagre resources, an unstable infrastructure, an atmosphere of openness to change, and strong leadership.

From the outset, this process has involved several stages. An initial preparatory stage is concerned with recruiting potential teaching staff, communicating the basic philosophy of the medical school and reaching consensus with regard to broad educational goals and curricular options.

The second stage begins with a review of recommendations by the staff of the curriculum development unit. These are merged into a first approximation of the curricular framework, which is then used to develop each segment of the programme in further detail. This task is entrusted to subject-area planning committees, which include clinicians and basic scientists. A set of competency-based objectives is specified, methods of teaching are selected, and an evaluation plan is elaborated. The planning committees also indicate the resources needed for implementation and designate the teachers who will prepare units of instruction and assume direct responsibility for courses. In all these activities, the planning committees are aided by staff of the curriculum development unit. The

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proposals of the various subject-area planning committees are then collated into a comprehensive projection for each phase of the curriculum.

In a third stage, these projections are presented for ratification by a representative coordinating council. It is the responsibility of the council to review the curriculum projection in terms of relevance of instructional objectives to institutional goals, consonance of teaching methods proposed with the specified objectives, and the weight assigned to each segment of the curriculum as indicated by the instructional resources requested.

The fourth stage is one of implementation and involves faculty members who are engaged in teaching the courses, an executive committee of each coordinating council, and the curriculum development unit.

A fifth stage occurs after completion of each course and is concerned with the need for curriculum modification in the light of feedback from different sources, including examinations and assessment of courses by students. These data are made available to the individual course planning committees, which generate recommendations for revision of objectives or methods of teaching. This completes a full cycle of the curriculum development process, which is repeated annually.

Innovation almost invariably results in greater demands on the time of the teaching staff. For most members of the faculty in Beersheva, even teaching a traditional curriculum would represent a difficult undertaking. This is particularly true of clinical teachers, who can barely cope with an overwhelming load of clinical responsibilities. Although most are prepared to accept the added burden associated with the experimental nature of the medical curriculum, without sufficient staff support their best intentions would be of little avail. This was recognized from the outset and a curriculum development unit was established at the time the medical school opened. The unit provides technical consultation and staff support to individual teachers, planning committees, coordinating councils and their executive committees. It mobilizes instructional resources, assumes responsibility for faculty development activities and oversees implementation of the evaluation system. The unit functions in a leadership role with respect to curriculum development and at the same time is responsive to the needs of teaching staff and students. Experience in Beersheva underscores the importance of this type of leadership and staff support in translating innovative ideas into viable programmes.

A sense of commitment and involvement among the faculty members is a necessary, but insufficient, condition for successful introduction of innovation into the curriculum. It must be complemented by the ability to apply new skills to the design and implementation of instruction. In the absence of such ability there is little likelihood that the rhetoric of curriculum change will result in educationally valid programmes.

Enthusiasm cannot replace competency and teachers who do not have these skills cannot be expected to apply them.

In Beersheva, the need for a programme of teaching staff development has been recognized since the early planning stages. Short-term introductory workshops in educational methods are offered several times each year. As the number of graduates of these workshops grows, opportunities for more advanced training will be provided. In addition, inservice training in the form of technical consultation by the curriculum development unit is provided throughout the year to individual teachers as well as to committees responsible for educational planning. The result of these efforts is a steady increase in the proportion of faculty members who have acquired the background and skills to implement effectively innovative aspects of the curriculum.

Assessing the impact of medical studies

Innovation in medical education often develops out of circumstances which are specific to individual institutions rather than as a result of planning for change at a national or international level. The impact of innovative curricula must therefore be judged in terms of the goals set by the particular medical school and the constellation of resources and constraints within which they are implemented. Considerable caution is necessary in attempting to generalize from the results obtained at any one institution.

Of primary concern is the impact of innovations in medical schools on the quality of health care. Curricular change may result in an increased capability of graduates to meet the health needs of the community. The distribution of career choices may become more responsive to the needs of the health care system and the quality of care provided by graduates may improve. These changes are, however, influenced by factors other than the nature of undergraduate medical education. Choice of specialty and selection of geographic area in which to practise may depend on such factors as personal background, economic incentives and family considerations. Also, the relative contribution of undergraduate medical education to the quality of ultimate physician performance as compared with that of subsequent postgraduate studies has yet to be clearly established.

Under these circumstances, it is difficult to trace the long-term impact of the medical school experience. Consequently, attention has focused on the evolution of knowledge, skills and attitudes during the course of the undergraduate medical programme itself. The relationship over time of such variables as clinical skills, attitudes towards patients and career projections to different components of the curriculum has been studied, particularly when major curricular innovations have been introduced.

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In the absence of definitive evidence, this approach rests on the logical premise that competencies and attitudes acquired during medical studies do indeed exert a significant effect on the future behaviour of the student.

With these considerations in mind, the evaluation system in Beersheva is designed to assess the progress of students through successive phases of the curriculum and to monitor their professional activities in subsequent stages of their careers. The longitudinal data acquired will serve to measure the long-term impact of the curriculum and to provide feedback for continuous curriculum development. Plans for the follow-up of graduates have been developed. Career choice, postgraduate studies, geographic area selected for practice and type of practice are among the variables to be monitored. This component of the evaluation system will be implemented when the first cohort of students graduates.

Measurement of student progress during the course of medical studies has received considerable attention in Beersheva. A principal concern has been to adapt the evaluation process to the educational goals of the medical school. Evaluation instruments used in the core curriculum are designed to determine the extent to which competency-based objectives have been achieved. They are independent of the particular teaching methods adopted and provide, in part, criteria for evaluating the instructional methods used. As indicated earlier, each competency is weighted in terms of the degree to which it reflects institutional priorities and the extent to which it constitutes a prerequisite either for ultimate physician practice or for entry into a subsequent phase of the curriculum. Testing of competencies judged to be essential will be criterion-referenced and all students will be expected to achieve a specified level of mastery. A greater degree of discretion will be accorded to individual teachers in evaluating the elective components of the curriculum.

Institutional goals are reflected in the process as well as in the content of evaluation. Prior to each course a pre-test is given which assesses the entry-level competencies required. The results are used to identify the need for remedial intervention in the case of individual students and to alert instructors to the need for possible modification of the course as planned. Progress tests are given throughout the course. To encourage individual initiative in learning, these are generally self-administered and self-evaluated by the student, who is then responsible for initiating remedial measures if required. At the end of each course, a post-test is administered. These procedures comprise the formative component of the evaluation system. Results are used for remedial intervention and planning course modification. They are not used for purposes of promotion.

While focusing on the content of a specific course, these various tests may incorporate integrative elements from other courses taught con-

comitantly or earlier. Vertical integration is encouraged by basing the post-tests of introductory courses on the prerequisites required for advanced courses. Test items emphasize problem-solving skills rather than recall skills and simulate conditions of professional performance in so far as this is appropriate and feasible.

Summative examinations are administered at the end of each phase of the curriculum and are used to certify student competency and readiness to enter the next phase of the educational programme. They also serve to determine the relative standing of the students.

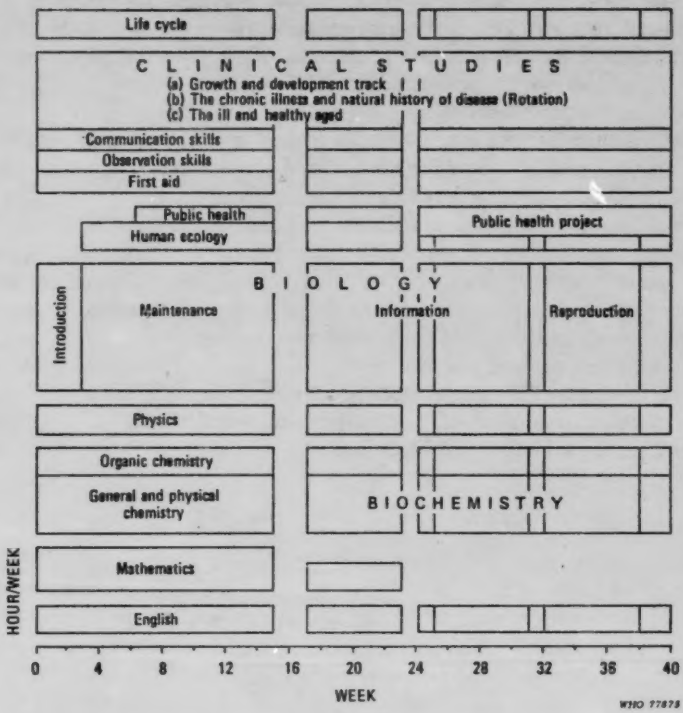
In addition to its impact on the students, the curriculum in Beersheva also impinges directly on the health care system in the Negev. Physicians and other health workers at community health clinics, hospitals and public health centers collaborate in the teaching programme. Linkages among health care facilities for educational purposes foster communication and open the way for the development of new functional relationships. Interaction between practitioners and the academic staff has stimulated reassessment of current medical practice and, to a limited extent, the introduction of innovation.

AN OVERVIEW OF THE CURRICULUM

The curriculum projection encompasses six and a half years of study, divided into five phases. It seeks to translate the principles described above into a programme of studies which will achieve the educational goals of the medical school. Basic sciences, clinical medicine and public health constitute the three principal areas of teaching. Instruction in each area begins in the first year and continues throughout the six-year programme. Just as clinical studies commence in the initial year and continue until graduation, so the basic sciences are not confined to the early portion of the curriculum. Both proceed in tandem, drawing on whatever fields of knowledge can contribute to solving the particular problem under consideration. This approach stresses the ongoing utilization of knowledge from the basic sciences to solve problems simulating those encountered in clinical practice. The complexity of problems and level of simulation increase progressively as students advance through the several phases of the curriculum. From the outset, appropriate experience in clinical and public health settings is interwoven with the acquisition of a knowledge base in the natural and basic medical sciences.

Phase I, which coincides with the first year of studies, is shown in Fig. 1. During this phase, students acquire a foundation in the physical, natural and social sciences. Concurrently, they begin clinical studies and learn basic skills in public health. In Phase II, shown in Fig. 2, which comprises the second year of studies, the basic medical sciences are introduced and

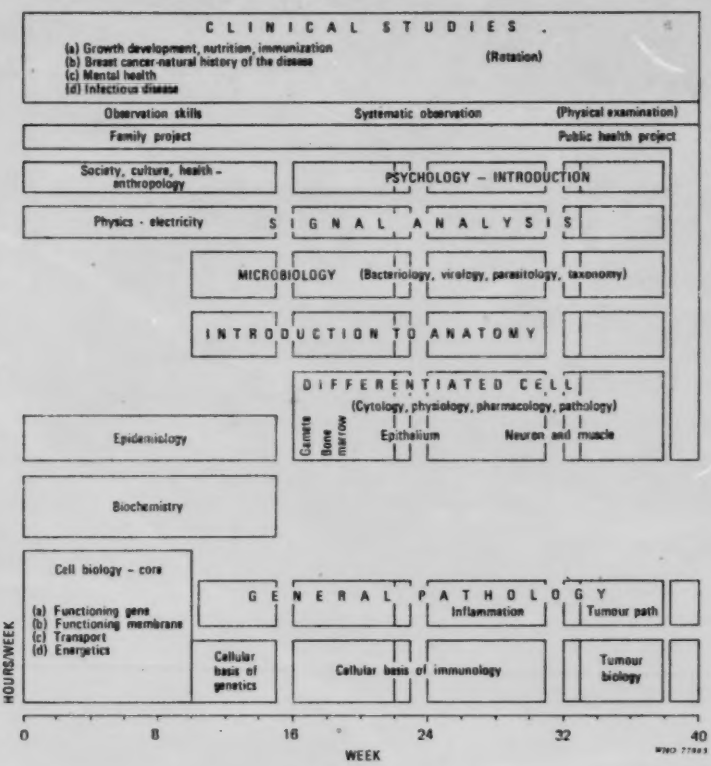
FIG. 1. PHASE I (CLINICAL STUDIES), FIRST YEAR



further clinical and public health competencies are acquired. Phase III, which is outlined in Fig. 3, extends from the third to the end of the fifth year of studies. It consists of integrated organ system modules which alternate with clinical clerkships. Phase IV is a one-year rotating internship required under the Israeli system of medical education. Phase V, the duration of which may be variable, offers students an opportunity to return to an academic setting for further elective work and study following completion of the internship.

Opportunities for elective study are provided from the first year of the programme. Contingent on acquisition of the core competencies, students are encouraged to pursue further study in areas of individual interest, whether within the framework of the medical school or in other faculties of the University.

FIG. 2. PHASE II (CLINICAL STUDIES), SECOND YEAR



SPECIAL INSTRUCTIONAL RESOURCES

The nature of the curriculum in Beersheva has given rise to the development of three distinctive instructional resources: a compilation of units of instruction covering virtually all segments of the curriculum; a learning resources centre which provides a responsive environment for student-initiated learning activities; and the first of a network of primary care teaching clinics.

Units of instruction

A substantial part of the teaching is based on units of instruction. These follow a standard format, which consists of three components. The

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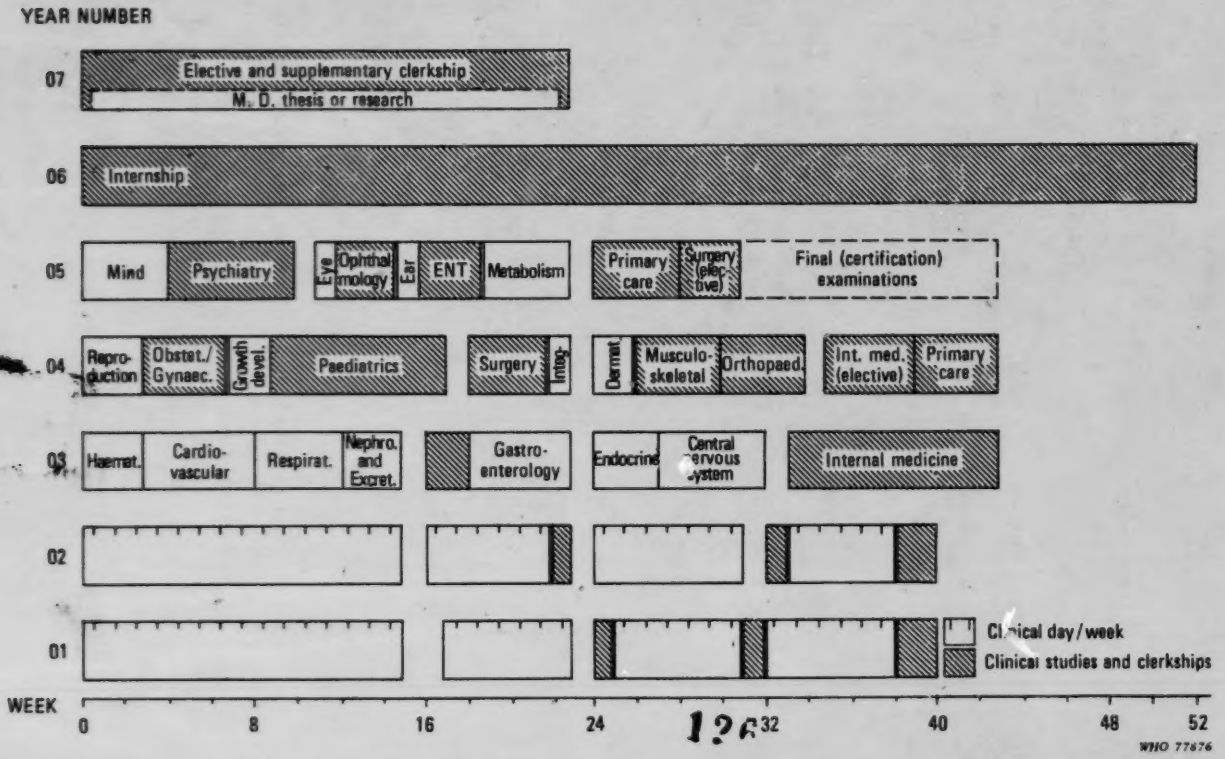
FIG. 3. PHASES III TO V (ORGAN SYSTEM MODULES ALTERNATING WITH CLINICAL CLERKSHIPS; ROTATING INTERNSHIP; ELECTIVES



first sets the boundaries of the unit. General subject areas and topics to be considered are specified and prerequisites are listed. These are followed by a set of key words and guidance questions related to each of the topics. Questions are classified according to cognitive level, from recall to problem-solving. Those which are recommended for elective study are so indicated. Skills to be acquired as part of the unit, such as laboratory techniques or clinical procedures, are stated in behavioural terms.

The second component describes the methods of teaching and evaluation to be used in the unit. It comprises directives for independent study, a description of in-class activities and a specification of the conditions of evaluation and expected student performance. A third component consists of suggested reading. A list of pertinent bibliographic resources is provided which together with the guidance questions communicate the anticipated scope and depth of learning.

The units of instruction serve several purposes. Firstly, by understanding what is expected, students are able to organize their learning activities in a rational manner. The distinction between core competencies and elective study provides guidance to students in setting priorities for allocation of effort. The communication of instructional objectives in operational terms also provides students with a frame of reference which encourages independent study and facilitates the process of student self-assessment. Secondly, the units of instruction establish a basis for student and teacher accountability which is not arbitrary. Test items for inclusion in intermediary tests, post-tests and certifying examinations are based on prototypes which appear in the units of instruction. The units are also used by joint faculty/student review committees to evaluate the quality of instruction in terms of the objectives to be attained.

A third function of the units of instruction is to facilitate horizontal and vertical integration. The flexibility of format enables an individual unit to be prepared and taught conjointly by instructors from several disciplines. The development of units of instruction for introductory courses is guided by prerequisites set for advanced courses. In this way, redundancy can be avoided while the adequacy of student preparation for entry into courses at successive levels of sophistication is ensured.

Development of units of instruction proceeds through a process of successive approximations. In some subject areas, the units adhere to the format described above. In others, they are more primitive and require additional revision. The eventual goal is to produce instructional learning packages. The learning package is an extension of the unit of instruction to include appropriate learning materials in a variety of media. It can be used either in a free-standing independent modality or as part of a course.

Learning resource centre

The learning resource centre is designed to encourage independent learning by providing an environment which is responsive to student initiative. In this role it complements the bibliographic resources available through the library. The centre may be used for remedial study, to extend learning beyond the limits set by course objectives and to explore new fields of interest. Students may conduct laboratory activities, arrange demonstrations, review audiovisual materials, practise clinical skills or initiate other types of learning activities.

Equipment and instructional software is concentrated in space designated for this purpose. Additional facilities may be mobilized on an *ad hoc* basis in other parts of the medical school, University, hospital and clinics. Members of the regular teaching staff and appropriate guest instructors advise individual students, provide guidance for groups working on projects and participate in special presentations, demonstrations and seminars. It is anticipated that the scope of the centre and the range of its activities will increase as the full complement of the six-year curriculum is reached.

Primary care teaching clinics

The role of the primary care teaching clinics is to provide community-based academic counterparts to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering health care and provide settings with appropriate role models for undergraduate and graduate education. Each clinic will have considerable autonomy in determining the manner in which health services are delivered and in matters related to internal organization and relationships with other components of the health care system. Procedures are being designed to evaluate both the process of providing services and the outcomes in terms of the health status of the population served. There is one important constraint. The ordinary operating budget of the teaching clinic will be similar to that of a regular clinic serving an equivalent population base. It is anticipated that this will increase the probability that measures introduced in the teaching clinics and found to be successful can be replicated throughout the Negev region.

Hospital-based physicians will provide consultative services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized. This linkage between hospital and community will provide a mechanism by which the primary care dimensions of medical practice can be taught effectively. During the hospital-based portion of the clerkships, students

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will participate in consultative services provided to the clinics. They will also have opportunities to follow patients, who, after discharge from the hospital, return to the clinics for continuing care. As part of the primary care, clerkship students will take part in the service and research activities of the teaching clinics. This includes following clinic patients during periods of hospitalization.

The first primary care teaching clinic was opened in the winter of 1976/1977. It is anticipated that additional clinics will be established as appropriate personnel and facilities become available. The manner in which these clinics evolve will be a major determinant of whether graduates of the medical school will be attracted to primary care careers in the Negev. To this end, the clinics should enable the physician to practise comprehensive medicine of a high quality, provide opportunities for research in primary care and facilitate interaction with other components of the health care system. As these conditions are attained in the teaching clinics, they will be replicated throughout the network of primary care settings in the region.

PERSONAL OBSERVATIONS

In its first three years, the educational programme at the medical school in Beersheva has acquired both direction and momentum. The direction has been consistently responsive to the goal of training a new type of physician. This is reflected in all aspects of the curriculum. The momentum, in turn, has in large measure been a result of the direction which the school has taken. The high level of commitment among teaching staff and students would have been unlikely in the absence of a challenge such as that posed by the innovative approach to medical education. The question at this point is whether the approach can be sustained as the novelty recedes.

Several considerations suggest that this may be the case, at least over the short term. The curriculum for the first two phases has proved to be fairly stable. It appears to have met the expectations of both teachers and students. Changes which have been recommended have been relatively minor and relate more to improving the quality of instruction than to altering the basic approach. Consonance between the system of evaluation and the process of instruction and the clear relationship of both to the educational goals of the medical school have probably been important factors in achieving this stability.

The integrated organ system modules and the clinical clerkships are being developed, for the most part, by teachers with experience in designing and implementing earlier portions of the curriculum. This experience

tends to reinforce commitment to the basic educational orientation of the school. As a consequence, continuity of approach is clearly evident in those parts of Phase III which have been developed until now.

The readiness of teaching staff, students and administrators to continue in the direction which was charted three years ago is not in doubt. Their ability to do so, however, will be conditioned by constraints in the Beersheva situation. Some are beyond the control of the medical school and will be determined by political, economic and social developments in the country as a whole.

Others, of a more local nature, include the direction in which health services in the Negev will evolve. Achievement of the educational goals of the medical school was predicated, from the outset, on simultaneous progress in improving the system for delivering health care in the Negev. This interdependence is manifest in the quantity and quality of physicians available for teaching, and in the academic standards of settings in which instruction takes place.

In summary, cautious optimism appears warranted in assessing the prospects of the innovative curriculum in Beersheva over the next few years. Contingent on adequate progress in the health care sector, it is likely that the programme of studies will continue to reflect the stated goals of the medical school. Under these conditions, it will be possible to assess the impact of curricular innovation on the professional performance of successive cohorts of students as they graduate and enter medical practice.

CHAPTER 8

THE RIJKSUNIVERSITEIT LIMBURG, MAASTRICHT, NETHERLANDS: DEVELOPMENT OF MEDICAL EDUCATION*

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EDITORIAL NOTE

The Netherlands is highly developed, densely populated, and possesses a generally well-functioning health delivery system. Geographic maldistribution of professional health personnel is not a problem, but even though medical care is provided through a system of general practice, the Netherlands' medical schools offer a specialty-oriented curriculum. The high cost of health care is a major concern.

A new Faculty of Medicine was authorized in 1974 to be the first faculty of a new university in the Limburg region. The Faculty of Medicine's purpose is to develop a system of medical education particularly oriented towards primary care practice in relation to Maastricht and the Limburg region. The University participates in a recently founded Regional Medical Centre, which is the mechanism established by the Government to contain costs and improve the health care delivery system.

The medical curriculum at Maastricht offers basic science instruction in an integrated way with the focus on medical or health problems. Students are expected to assume considerable responsibility for their own learning in order to acquire the important skills of self-assessment and self-education. The curriculum emphasizes an awareness of social needs and problems, and students are introduced to the practice of health care in their first year.

The evaluation programme and process are a dominant feature. The evaluation plan takes into account student performance assessment, instructional programme evaluation, and institutional factors in immediate, intermediate and ultimate goals.

The implementation of this carefully designed educational programme was helped considerably by the absence of two often-found constraints: the University's organizational structure was developed to be consistent with, and supportive of, the educational concepts; and, because the Netherlands has no national accrediting or licensing bodies, the school has a great degree of freedom to define its own graduation standards.

The geographic situation of the Netherlands is unique in Western Europe. It is a delta region; 27% of the country lies below sea level and in this area 60% of the population lives. Many parts of the country have been reclaimed from the sea. The total area of the Netherlands is approximately 40 000 square kilometres.

About 70% of the terrain is used for agriculture, 8% is forest land, 8% is composed of built-up areas, roads and industrial premises and another 8% is water.

The country is densely populated. The population increased from 4 million in 1880 to 13.8 million in 1976. The birth rate has traditionally been rather high in the Netherlands compared with neighbouring countries. This factor, combined with a low infant mortality and a favourable life expectancy, produced a considerable annual population growth up to 1970. Since 1970, however, the situation has changed. The birth rate declined sharply, from 16 per thousand in 1970 to 13.7 per thousand in 1972 and to 12.9 per thousand in 1976. Meanwhile, the number of deaths per year increased slightly. These changing trends drastically influenced population forecasts: instead of a growing population until

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the year 2000, it is now expected that by 1985 a maximum population of about 15.5 million will be reached, with a slow decrease thereafter.

Industrial and trade activities are the most important income sources for the national economy. These activities are mainly concentrated in the western provinces. The Rijksuniversiteit Limburg is a new university located in the city of Maastricht in Limburg, the southernmost province. This region was a wealthy mining district until the early 1960s, when the Government decided to close all coal mines. Huge natural gasfields had been discovered in the north of the country, and coal mining was relatively expensive. As a compensation for the resulting loss of much employment in the region and in line with the national policy of stimulating economic activities in regions outside the overcrowded western provinces, the Government transferred some administrative services to Limburg and subsidized new industrial activities. The foundation of a new university was also partly a consequence of this policy.

HEALTH

According to generally accepted indices of national health conditions, the Netherlands is in a rather good position in comparison with many other countries.

Infant mortality is 11.1 per 1000 live births (1974), among the lowest rates in the world. Average life expectancy at birth is 71.6 years for men and 77.6 for women (1974). The sex difference in life expectancy is mainly due to the higher risks of lung cancer, heart infarctions and traffic accidents among men. The daily average calorie intake is around 3000 per person; 99% of the population receive their water from the central water supply. Most houses have both electricity (97%) and gas (85%). The average number of persons per dwelling is 3.15; 90% of the houses have more than 3 rooms.

Health care system

The Netherlands does not have an integrated health service and public health care system, but rather a mixture of services developed largely through private enterprise. The role of the Government has been traditionally to stimulate these services by direct subsidies, by social and health legislation, and by establishing additional services.

Historically, general practitioners have held a strong position in the health care system of the Netherlands. This position is reinforced by social insurance and private health insurance regulations, which require in most cases that specialist care and hospital treatment can only be refunded if prescribed by a general practitioner. Most general practi-

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tioners are in private practice, with a minority cooperating in group practices and local health centres.

The total number of active physicians is 20 200 (1975); 4800 of these are general practitioners, 6600 are specialists, and the remainder work in preventive medicine (e.g., industry, schools, and public health services), education and research. The number of specialists is rising at a higher rate than the number of general practitioners. About 880 midwives render obstetrical aid in some 40% of deliveries (1974). This type of health worker receives three years of training at a midwifery school. There are about 1150 pharmaceutical chemists in the Netherlands.

Relevant figures about inpatient care are presented in Table 1.

TABLE 1. SOME QUANTITATIVE ASPECTS OF THE NETHERLANDS HEALTH CARE SYSTEM[a]

Institutions			
Category	Number	Number of beds	Number of staff employed
Hospitals (including university hospitals)	255	74 480	112 000
Psychiatric hospitals	69	28 100	22 800
Nursing homes	290	23 350	34 100
Institutions for mental defectives	123	36 160	18 100
Other institutions and extramural care	. .	3 800	53 000
Total	. .	165 890	240 000

[a] Data are 1974 estimates, obtained from publications by the Chief Medical Office, the National Hospitals Institute, and the Central Bureau of Statistics.

Preventive health care in the Netherlands is, except in a few large towns, mainly provided by the "Green Cross", a federation of formerly separate organizations. This organization employs about 4000 district nurses, who participate in baby and toddlers' clinics. These clinics have developed strongly and about 70% of children in the relevant age groups attend. Tuberculosis control centres are also operated by the Green Cross. The national Green Cross's task is mainly informational. Apart from the Green Cross, there are other associations specializing in certain fields (e.g., the foundation for sufferers from kidney and heart diseases). Numerous organizations cooperate in the National Federation for Mental Health.

Each province also offers psychosocial care, which may, to an increasing extent, prevent hospitalization in mental homes or shorten the duration of such hospitalization by offering better follow-up care.

Health insurance for the lower- and middle-income groups is provided by government regulation, 9.3 million people being covered by a system of "sick funds". The basis of this system is the Sick Funds Law, which provides for a compulsory sick fund insurance for wage earners with an annual income of under about 32 000 guilders,[1] a special insurance for aged people, and a voluntary insurance for other people earning less than 32 000 guilders a year.

General practitioners receive a fixed annual fee per insured person. Special fees for hospital treatment and specialist treatment are negotiated on a national scale between the sick funds and the specialists organizations.

There is great concern about the considerable increase in the cost of health care. Other difficulties have also been identified. The system of health services displays insufficient cohesion. There is a lack of coordination between services at different levels as well as between those at the same level, thus causing a duplication of care in some instances. The present structure for the financing of health care is fragmented and obscure; in certain cases it does not foster the necessary collaboration between the services. Because financing adapts passively to existing organizational situations, it does not exert a corrective influence on the coordination of the various services. There are, for instance, considerable differences in the number of hospital beds per 1000 inhabitants between certain regions, a fact which cannot be explained by differences in the health condition of the population. As one of the means of arriving at an effective and efficient health care system, the Government intends to start a regionalization policy; the country will be divided into areas each with an integrated health services system. The region of Southern Limburg (650 000 inhabitants), in which the Rijksuniversiteit Limburg is located, will be a trial area for this new policy. The recently founded Medical Regional Centre, in which the university participates, will play an important role in the implementation of this policy.

EDUCATION

Nearly all children of age four and five years receive nursery education. From the age of six, all children must attend primary school for a period of six years. Secondary school also lasts six years. Success in the final examination automatically gives the right of admission to university education, although some restrictions have recently been introduced (*vide infra*). The third educational level includes the universities and institutes for higher vocational education (e.g., polytechnics and teacher

[1] Approx. 2.5 guilders = US $1 (1977).

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training colleges). Out of a total of some 120 000 university students, 18 000 are medical students.

The eight medical faculties in the Netherlands have six-year programmes. Students then receive additional professional training, which varies from one year for general practitioners to several years for other specializations. Professional training is mainly the responsibility of the professional associations. Continuing education in medicine will be an important new responsibility of the medical faculties, according to a recent law.

RIJKSUNIVERSITEIT LIMBURG

In 1967, the Government of the Netherlands decided to establish the eighth medical faculty in the Netherlands, at Maastricht. The first staff members were, however, appointed in 1973. The new medical faculty finally received its first 50 students in 1974.

As faculty organization is still evolving, current figures on staff composition do not give an adequate picture of planned ultimate composition; however, a number of disciplines (*capaciteitsgroepen*) are already well developed. Table 2 presents the composition of the different *capaciteitsgroepen* in the faculty.

TABLE 2. STAFF COMPOSITION OF THE MEDICAL FACULTY

Department	No. of staff
Central services	200
Capaciteitsgroep biomedical	100
Capaciteitsgroep social sciences	40
Capaciteitsgroep clinical/general practice	85
Others	40

As the University is, in effect, still a one-faculty university, the total number of people working in the central university services (administration, library, personnel department, etc.) are included in Table 2. It is clear that the social sciences are well represented. This reflects one objective of the Medical Faculty: to integrate biomedical and psychosocial aspects of medical education.

Although it will be some years before the Faculty can be brought to maximum capacity, it has admitted 50-60 students in each of its four years of operation. There are now 200 students. The annual intake of students is expected soon to increase to 150 students. The admission

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of students is subject to legal regulation, effective for all medical faculties in the Netherlands. Up to some years ago every applicant who had passed the appropriate secondary-school examinations automatically had the right of admission to university and embark on any studies of his choice. In recent years, the Government has been forced to make restrictions, especially in the medical faculties, where the number of applicants is twice the number of places available. The present admission system is based on a weighted lottery in which applicants with better final examination results have greater chances of securing a place. Within each level, selection is random. Students can indicate their preferences among universities but a national committee makes the final decision on placement.

THE PROGRAMME OF MEDICAL EDUCATION

The objectives of medical training in the Netherlands are defined by law. The main objective, as contained in Article 28 of the Academic Statutes, is "that the doctor, by virtue of his having passed his medical final examinations, be capable of practising medicine".

In the elaboration of this very broad objective, the institution clearly has a fair amount of freedom to determine the specific character of the curriculum. At the Rijksuniversiteit Limburg, the Medical Faculty has chosen to focus on primary health care in its teaching and research, an emphasis which is not customary at the other seven medical faculties in the country. This philosophy is reflected in curriculum objectives and design at several levels. Most generally, the programme aims at problem orientation, rather than discipline orientation, and thus at the development of problem-solving abilities as well as the knowledge needed by primary care physicians. Associated with this emphasis is concern for the development of self-initiated, and self-evaluation of, learning and work habits and attitudes, and an awareness of the social needs and problems to be confronted in primary health care. At a more specific level, objectives have been formulated focusing on: physician abilities in the problem-solving cycle, doctor-patient relationships, intervention in emergencies, referral processes, coordination and collaboration with other facets of the health system, establishing continuing treatment and post-care plans, preventive medical care, social skills, management of primary care, and continuing education.

Curriculum characteristics

The curriculum is organized according to the problem areas of primary health care, rather than according to a strict framework of basic

and adjunct disciplines. Students are confronted, right from the start of their studies, with the kind of problems that occur in the daily practice of the primary care physician. Each instructional unit presents one or more such problems in booklet form. While working through these, students are expected to identify and obtain the information and disciplinary knowledge needed to solve each problem. Resources in the form of a basic reference book, a library of textbooks and other materials, as well as consultations with experts in various fields, are available to the students.

There are no lectures. Students must reason through and discover what they need to know in the context of each problem. In this way, it is hoped, the student attains a deeper and more lasting insight into the relationships among various disciplines and the relevance of their integration in primary practice. Furthermore, the student builds individual strategies, abilities and attitudes for effective independent learning, problem-solving, and self-evaluation.

The curriculum thus allows more scope for the student's own initiative than is typical in the other medical faculties in the Netherlands. Underlying this approach is the experience that information which has been actively sought retains its usefulness for a longer period than that which the student has received in a more passive manner. A programme that stresses student initiative is furthermore a truer reflection of the character of the student's career: he himself must ensure that his knowledge remains relevant and up to date.

Collaboration with fellow students on the problems presented is another basic theme of the curriculum plan. Students are randomly sorted into groups of eight, each with a staff tutor who is responsible for promoting the group process rather than a particular discipline. This group work serves a dual purpose. It is an exercise reflecting later medical practice, in which collaboration with others is becoming increasingly important, and the student working within a group is constantly made aware of how his own effort compares with that of his fellows. The small group process thus provides a form of supervision of the effort and progress of each student, while at the same time providing close experience in collaborative work.

The curriculum is divided into programme blocks of six weeks' duration. In each block, one central problem or theme is treated. In this way, the inefficiencies of traditional diffused coverage of a large number of disciplines are avoided. The problems treated during a single programme block are presented in detail in the form of prepared workbooks. These give the theoretical and practical context of each problem and other relevant information. Students add notes made during problem solution. Both work groups and independent study of related material

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run in parallel. The workbooks also provide a major vehicle for curriculum improvement. They are developed by staff committees and revised each year on the basis of experience and evaluation data. The revision process involves a large number of people, thus safeguarding the integrated character of the programme.

Specific instruction and practice are given from the beginning of the first year to develop skills essential for responsible medical practice. Acquisition of these skills begins, in most cases, in the laboratory, where more flexibility can be achieved than in actual health care practice. Work in the laboratory can be specifically directed, without burdening staff and patients in health care facilities. Over 150 skills are taught in the laboratory, ranging from basic measuring skills (e.g., taking blood pressure), through interviewing and physical examination skills, to basic treatment procedures (e.g., giving injections).

Students are also introduced, albeit on a modest scale, to the actual practice of health care. By observing and helping in the daily practice of a general practitioner, by a short period of service in a hospital, and by first-hand experience within other organizations in the medical sector (e.g., local clinics, dispensaries, and school and industrial medical departments) students become acquainted with day-to-day health care practice. This has been found to act as a strong motivating force to students in their period of study, and it also provides a measure of insight into the structure and working methods as well as the problems of the health care system. Of still more importance, however, is that the problems and exercises covered in the workbooks and study groups become directly connected to real health care procedures and problems.

Curriculum design and revision

The first year of the programme is devoted to an introduction and orientation to medicine and medical care. The second year concerns the study of the healthy individual in relation to his physical and social environment, dealing with such topics as "growth and development" and "moving and working". In the third and fourth years, the various complaints faced by the primary care physician are examined, including such topics as "fatigue", and "loss of blood". The curriculum for the fifth and sixth years has not yet been fully worked out.

The design of the curriculum is best seen by examining one block within one year. Programme blocks for the first four years are listed in Table 3. One of the problem areas faced (in block 1.5) is arteriosclerosis. Fig. 1 shows a matrix scheme used to divide this domain into three problems and to identify the contributions of each of various disciplines to the understanding and treatment of each problem. In Fig. 2, a still more detailed matrix shows a breakdown of one of the problems,

TABLE 3. PROGRAMME BLOCKS FOR THE FIRST FOUR YEARS

Year 1	Year 2	Year 3	Year 4
1.1 Introduction to medical studies	2.1 Embryo and fetus	3.1 Fatigue	4.1 Abdominal pain
1.2 The health system; introduction to first-line care	2.2 Childhood	3.2 Ways of living	4.2 Gynaecological complaints
1.3 Traumata	2.3 Adolescence	3.3 Fever and inflammation	4.3 Headache and psychiatric problems
1.4 Psychosomatics	2.4 Adulthood	3.4 Chest pain	4.4 Electives
1.5 Atherosclerosis	2.5 The elderly	3.5 Loss of blood	4.5 Electives
1.6 ← Evaluation period (duration, 2 weeks), common to all students →			
1.7 Tumours and inflammation; introduction to hospital care	2.7 Electives	3.7 Electives	4.7 Pain in the back, arms and legs

myocardial infarction, into its constituent topics and their disciplinary connexions.

Instruction units, made up of problems and related materials, are formulated by multidisciplinary planning groups, with the advice of groups of experts from the various disciplines involved in the study of a specific topic. Each detailed instruction matrix interlocks with the next

FIG. 1. EXAMPLE OF A BLOCK MATRIX: FIRST YEAR (BLOCK 1.5), ARTERIOSCLEROSIS

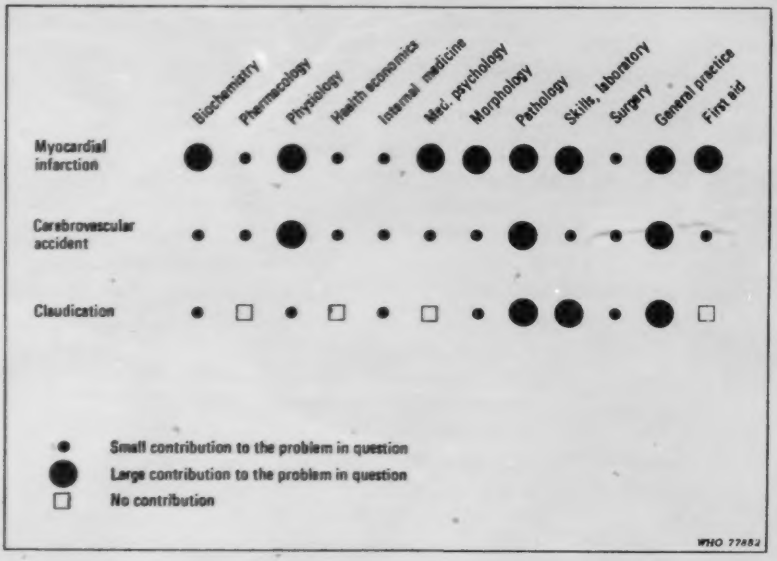

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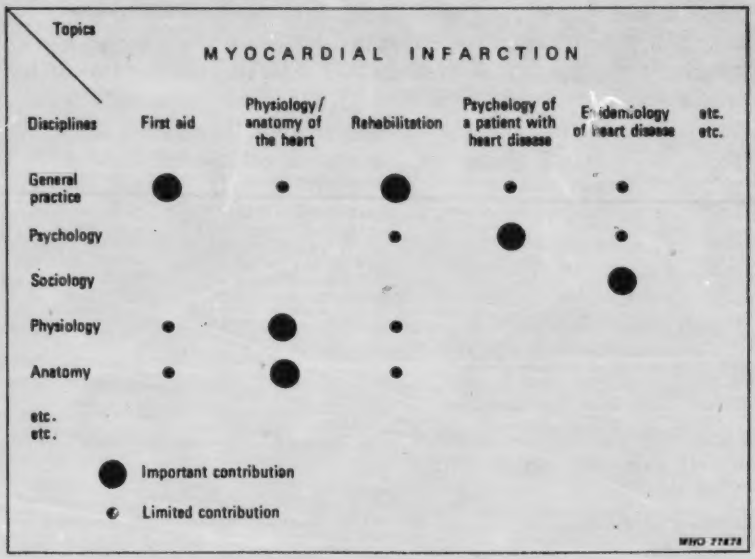
FIG. 2. MATRIX SHOWING THE BREAKDOWN OF THE SUBJECT MYOCARDIAL INFARCTION INTO ITS CONSTITUENT TOPICS



level of matrices up to the programme blocks for the whole study year. The sum total of all matrices for all study years should, ideally, indicate the ground that has been covered by the student in the course of his studies. The instruction matrices also provide a means of measuring the extent to which the various disciplines are represented in the curriculum, and whether they are evenly spread over the programme. Discrepancies between a matrix as drawn up in the planning phase and the results actually attained form, in combination with other evaluative data, a basis for revision of the instruction units for the following student group.

The curriculum as the student sees it

On entry, the student undergoes an initial assessment, consisting of tests and questionnaires on personal characteristics. This assessment is used for the programme evaluation system. The student is then assigned to a work group for the first programme block. He receives *A Companion to Medical Studies*,[2] his first workbook, and an orientation to the library, the laboratory, and other aspects of the Medical Faculty and its environs.

[2] PASSMORE, R. & ROBSON, J. S., ed. *A companion to medical studies*. Oxford, Blackwell, 1973.

For each instruction unit, the workbook provides information on the problems under study, the exercises to be completed, the programmed group session, and so on. There are at least two group sessions per week, each lasting two hours, and conducted under the guidance of a staff tutor. The purpose of these sessions is to delegate duties and to decide upon a working procedure. Students may, either individually or in groups, consult experts on any aspects of problems which they are unable to deal with otherwise.

At the completion of a block, a block test is done by the student for formative evaluation purposes. He receives feedback from this test and is randomly assigned to a new working group. The early problem studies merely provide an initial introduction to the topics treated. The curriculum is so designed, however, that these topics recur throughout the course, each time in more depth. In the first year, the student should gain a general impression of the various branches of health care and their medical problems, and become acquainted with a variety of basic subject elements as well as with topics from clinical medicine. He will begin acquiring basic medical skills as well as skills in human relations, and will perform fairly frequent evaluation tasks.

To date, the programme has benefited greatly from the sense of participation in a bold new venture in medical education felt by students and staff alike. It remains to be seen whether continued development of the Medical Faculty and successive generations of students can maintain this drive toward accomplishment.

EVALUATION

Background

The general background of the evaluation concerns of the Faculty have been described by Wijnen & Snow.[3] These evaluation concerns define the categories shown in Table 4. Immediate goals of the programme and their evaluation have been distinguished from intermediate and ultimate goals. Three levels of evaluation have been identified: individual student level, instructional programme level, and the institutional level beyond the programme. Finally, within the immediate goals, formative and summative needs have been separated. In each cell are delineated the more important evaluation criteria of concern to the Faculty. Attention is given here to the immediate goals relating to individual students and to the instructional programme. But further elaboration and specification

[3] WIJNEN, W. H. F. W. & SNOW, R. E. *Implementing an evaluation system for medical education*, Maastricht, Faculty of Medicine, 1975 (Technical Progress Report No. 1).

of all cells of Table 4 will ultimately be needed. Given the variables identified in Table 4 and the nature of the curriculum as it has so far been developed, it is possible to specify the initial evaluation system.

Measures

Snow[4] presented a schematic diagram to depict medical educational processes in the physician's professional lifetime and to identify nine categories of measures potentially useful for evaluation purposes. An adapted version of this scheme is presented here in Table 5. Of the nine original categories of measures, only six are applicable to the present situation. These are: entry measures, study progress measures, work samples, unobtrusive measures, course descriptions, and institutional descriptors. The other three categories — exit measures, practice survey, and career review — pertain to future stages of student and graduate careers (one exit measure, the exit interview, is now used though it is not listed in Table 5). Of the three entering classes, four students have

TABLE 4. EVALUATION CONCERNS OF MEDICAL EDUCATION IN THE RIJKSUNIVERSITEIT LIMBURG FOR WHICH MEASURES ARE REQUIRED

	Immediate goals		Intermediate and ultimate goals	
	Formative	Summative		
Individual student level	Knowledge blocks Clinical skills Retention Teamwork Self-initiated study and evaluation Motivation Satisfaction Professional attitudes Problem-solving ability	Summation of knowledge over blocks Responsiveness to remediation	Continuation over years of immediate goals Licensing Admission to specialty training Choice of primary practice	Quality of primary care practice after graduation
Instructional programme level	Aggregation of above Materials effectiveness Teacher effectiveness Adequacy of support services Programme integration Discipline integration Teacher morale	Comparison with other universities on examinations, drop-outs, etc.	Aggregation of individual intermediate and ultimate goals	Aggregation of individual intermediate and ultimate goals
Institutional level beyond programme	*Esprit de corps* Administrative effectiveness Cost efficiency	New student interest in Rijksuniversiteit Limburg Continued governmental support	Relations with region Relations with world Impact of Rijksuniversiteit Limburg research in region Impact on physicians in region	Quality of health care in region

[4] SNOW, R. E. *An evaluation system for medical education*, Leiden, Faculty of Medicine, 1973.

TABLE 5. CATEGORIES OF MEASURES FOR THE EVALUATION SYSTEM

Categories	Construct and measures	Outcome to which construct and measures are relevant
Entry measures		
Abilities	Verbal analogies Nonverbal abstractions Number reasoning Word functions	Relations between aptitudes and all educational outcomes, comparisons with other universities
Personality and styles	Support Conformity Recognition Independence Altruism Leadership Achievement motivation Failure anxiety Facilitating anxiety Self-orientation Interaction-orientation Task-orientation	
Career interests and expectations	Specialty interests rankings * Biographical inventory	Choice of primary practice
Specific prior achievements	Physics knowledge Chemistry knowledge Biology knowledge	
Biographical data	Sex Type of secondary school * Biographical inventory	
Study progress measures		
Course examinations	Block tests Year tests	Knowledge acquisition and retention
Special examinations	Shared examinations	Comparisons with other universities
Attitudes, study habits, etc.	* Biographical inventory	Self-initiated study and evaluation, motivation
Work samples		
Clinical simulations	* Problem-box assessment	Problem-solving ability
Supervisory or peer ratings	First aid skill rating Blood pressure skill rating * Other skills	Skill acquisition
Unobtrusive measures		
During student years	Student use of remediation Volunteering for holiday work Leaving first year early	Responsiveness to remediation Motivation Motivation
Curriculum descriptors		
Materials	Block booklets	
Participant observer-student	Block teaching questionnaire	Materials effectiveness: satisfaction
	Block matrix questionnaire	Materials effectiveness: satisfaction
	Tutor comparisons	Teacher effectiveness: satisfaction
	Programme questionnaire	Programme integration: satisfaction
External evaluation	External review committee	
Participant observer-teacher/staff	Reports from the planning groups	Teacher morale, all above
Institutional descriptors		
Participant observer-teacher/staff	Staff member activities Studies Cost/benefit studies	
External evaluation	External review committee	

* Measure contemplated or under development, but not yet applied.

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dropped out of the programme to date, owing to reasons of career choice, features of the existing programme, or personal reasons. Extending this existing system to its full range presupposes a tenth category, i.e., indicators of health care quality and needs in the community and the adaptation of the Faculty to them. In the following sections the different evaluation categories are described in detail.

Entry measures. Entry measures serve two purposes. One is to provide a representative sampling of aptitude constructs for use in describing student characteristics relative to other populations and in analysing achievement in terms of individual differences among students. The other purpose is to bring into any particular evaluation study specific hypotheses about the kinds of students who do well or poorly under given instructional conditions. The initial choices of measures are, of necessity, largely exploratory but can be revised after some years to produce a standard entrance assessment procedure.

To obtain a representative sampling of potentially relevant student differences, the initial battery was composed of: four different cognitive ability tests; measures of prior achievement in three content areas; and three personality inventories that included a total of twelve scales. The personality measures were chosen to cover generally the areas of motivation and social aspects of personality presumed relevant to medical education. Four scales in particular were thought to be relevant to performance in an instructional situation of the sort provided at the Rijksuniversiteit Limburg. These were: social support, independence, achievement motivation, and interaction orientation.

This initial test battery has been used, with minor modification, with entering students in all three years so far. Analyses of data from these years to identify measures that can be dropped are under way. It was felt, however, that another mechanism was needed to extend the descriptive power of the entry battery and to inquire into other background factors relevant to career motivations and study habits of special importance to medical students, without adding many more separate measures. A specially constructed biographical inventory to serve these purposes is now in preparation.

Study progress measures. The examination requirements for the basic six-year course in medicine are in a general way specified in the Academic Statutes, which define the structure of all curricula in university education in the Netherlands. But there is no national board of medical examiners and each medical faculty has the right, by law, to construct its own programme and examination system within the framework of the general requirements. Theoretically, then, different faculties can deliver physicians differing widely in knowledge and skills. In practice, however, these

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differences are not great since there were only seven medical faculties in a relatively small area, all using fairly similar traditional course examination procedures.

A block test, consisting mainly of true-false items, is administered at the end of each programme block. These tests are constructed by the planning group in charge of the block and sometimes a selection of items suggested by students is added. Patient management problems have also been used.

At the outset, the formative function of the block tests was stressed: the student received feedback on his strengths and weaknesses and the planning group could check for weaknesses in the block content.

The block tests were, however, also used for summative evaluation in a procedure called the "evaluation contract". This evaluation contract specifies a differentiated set of faculty and student actions based on the block test scores. The lower 15% of the scores on each of the nine block tests in a year is chosen as a cut-off between a "normal" result and a "signal of possibly weak performance". If a student is in the lower 15% group twice, a staff member and the student discuss possible reasons. If a student falls within the lower 15% three times, the Faculty asks him to complete a new task related to the content of these blocks. If a student is in the lower 15% group four times, a more extensive remedial task is required to be completed before the start of the next year. If a student reaches the lower 15% group five times, the Faculty prescribes the remedial content for the next year, ruling out elective choices by the student. Six times or more in the lower 15% means that the student must repeat the course year in its entirety. At the end of the first year, 7 of 49 students had to complete an additional task as a result of this contract.

As part of the block test of the last block in a year, a selection of test items from previous blocks is included to serve as a retention measure (year test).

Work samples. Another set of evaluation measures are work samples. In a real sense, this category represents the most important set of evaluation measures for the Medical Faculty. While the block tests and year tests described above can be used to show whether students are acquiring factual knowledge appropriately, they cannot reveal the growth of problem-solving abilities or clinical skills. The stress in the programme on problem-solving orientation, individual study choices, and practice-oriented knowledge is incompatible with classical forms of achievement testing, which may force students to adapt their study to examination demands rather than to primary programme objectives. Yet, the development of adequate measures of problem-solving ability and clinical skill is a particularly difficult psychometric problem. Two kinds of work

sample measures are under development which it is hoped will play an increasing role in the evaluation system. One of these is an integral part of laboratory work. Skills (e.g., interviewing, blood count, and heart-massage) are evaluated in a criterion-referenced way: for each skill, standards are formulated which must be reached by all students. Frequent retesting of the skills guarantees their maintenance throughout the curriculum. New skills and standards are added regularly.

Two experimental variants of a test for problem-solving ability are at an early stage of development. These measures are called "problem boxes" and are based on the problem card decks used for educational purposes at McMaster University, Hamilton. One version uses a paper and pencil format, the other an automatic slide projection format.

Unobtrusive measures. At present, various possibilities for unobtrusive measures are being considered. Regularly collected data on student activities, such as choice of electives, committee membership, and participation in planning groups, will enable an analysis to be made at a later stage.

Curriculum descriptors. A number of data sources are used here:

(*a*) Data from students. Together with the block test at the end of each block, students complete a questionnaire on different aspects of their experience with the block content and their functioning in the work groups. Some of the same questions appear in every block questionnaire, in addition to issues relevant to a specific block. Summary analyses of these give a picture of the curriculum from the students' point of view. Item analysis of the block tests is also a rich source of information.

(*b*) Assessment of the quality of the tasks performed by students during the blocks is another source of information for the evaluation of the course. The planning group compiles these data in a report for the educational committee of the Faculty. During the last block in each year, in the evaluation period, a questionnaire covering the total year programme is administered.

(*c*) Data from tutors and content experts. During each block there is a weekly meeting between the tutors and the block planning group in which the progress of the block is discussed and evaluated. The planning group also receives informal opinions and suggestions from content experts who have been consulted by students during the block.

Institutional descriptors. Describing the functioning of the institution as a whole is, so far, primarily a task for the Department of Planning and Organization. As an example, staff members' work loads are recorded and compared with preset norm loads. Cost/benefit studies using these data are planned for the future.

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The University also invited a number of experts in medical and educational affairs to form an External Review Committee. The major tasks of this committee are to provide objective criticism, to help to ensure that the objectives of the programme are being implemented, and to help with the difficult process of interpreting evaluation data. The Committee examines and documents the educational experiment on the basis of data provided by the institution, but also using information obtained through conferences with staff members and students and their own observations.

Extensions of the evaluation procedure

Although the evaluation system met with few criticisms during its first year of operation, a number of critical points have been put forward recently, especially in connexion with the second-year curriculum.

These criticisms can be summarized as follows:

(*a*) The educational system encourages the work groups to select their own points of interest from the course manuals but the block tests are the same for all students. Also, these tests are constructed from the course manual content, so they make little or no reference to other materials consulted by work groups in following their own choices.

(*b*) There are strong indications that students develop a test-oriented learning attitude when confronted with a test combining formative and summative functions.

In view of such criticisms, the Faculty split the formative and summative evaluation functions. Block tests are now used only for purposes of formative feedback to students and the planning groups. Block test results are combined with other student performance data to give more comprehensive feedback. A series of "screening" tests have been constructed for the purposes of summative evaluation. These include true-false questions, but also patient managment problems and other questions pertaining to practice-oriented primary care problems. These "screening" tests are administered to all students, regardless of their year in the programme, several times each year. Continued increases in the number of questions answered correctly and problems solved can be taken as a measure of growing study progress and programme effectiveness. Further requirements for qualification as a physician can, of course, be added as later years of the programme are reached.

One indication of the functioning of these screening tests can be seen in the results of the first such test, which included 223 questions and was administered in November 1976. Table 6 shows the results for the three-year groups and also a comparison with practising physicians who also answered all questions.

TABLE 6. FIRST SCREENING TEST RESULTS, 1976-1977

	First-year students	Second-year students	Third-year students	Practising physicians
Items				
Average percentage correct	19.0	37.3	45.3	89.0
Standard deviation	9.6	12.7	14.7	18.2
Problem box				
Average percentage correct	19.8	24.0	24.4	Not given
Standard deviation	6.2	8.3	8.5	Not given

On the test items, there is a clear progression across the groups. Third-year students have apparently reached a level of performance on such a test that is about half the level attained by the practising physicians. The problem box did not show a similar progression, though it did distinguish first-year students from others. This was a first trial for such a measure. The problem-solving portion, especially, will require expansion in the future.

PERSONAL OBSERVATIONS

The Rijksuniversiteit Limburg experiment is still very much in the developmental stage. It is an experiment involving the creation of a wholly new institution, not just the introduction of an innovative programme within an existing institution. Thus, institutional evaluation, not just programme evaluation, is required. The evaluation system must function as a continuous longitudinal study of the institution and its students. A complex of relevant data is accumulating and being analysed within this study, and periodic technical reports will be issued as the work continues. It is far too early for conclusions in an undertaking of this magnitude, but the hope exists that the institution and its evaluation will ultimately provide not only an example of effective medical education for primary care physicians but also a contribution to more general knowledge about the promotion and evaluation of medical education.

CHAPTER 9

FACULTY OF MEDICINE, RAMATHIBODI HOSPITAL, BANGKOK, THAILAND: TEACHING COMMUNITY HEALTH CARE

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EDITORIAL NOTE

The goal of the Faculty of Medicine at Ramathibodi Hospital reflects Thailand's urgent need for professional health workers who can function effectively at the primary health centres using the available resources. The community health care programme described in this case study is one effort by the Faculty to accomplish this goal. The programme involves the offering of preclinical and clinical courses, providing health care services in model centres, and conducting operational research and short-term workshops.

Several organizational characteristics of this programme are worthy of consideration. First, it is an interdepartmental as opposed to a departmental programme. Interdepartmental programmes have many advantages and are useful when implemented in certain situations.

Another organizational characteristic is that the teaching responsibility of the programme is multiprofessional, involving courses for physicians, nurses and other members of the health team. Complete coordination of medical and nursing students courses, however, has not been achieved. Here, again, is one more example of the difficulties encountered when attempting to coordinate the education of professional health personnel who are expected to work together after graduation.

The evaluation of the programme is limited, although it is claimed that there are some encouraging signs. For instance, fewer graduates are going abroad, and a higher percentage of Ramathibodi graduates who have had rural experience are choosing to do internships in provincial hospitals. If future evaluation supports these early indications, some credit can be given to the community health care programme for influencing this result. It is, however, exceedingly difficult to influence the characteristics of graduates when student contact is restricted to a very small percentage of the total educational programme.

Thailand is the third largest country in South-East Asia, with an area of approximately 518 000 square kilometres. Situated in the Indochina peninsula, which separates the Indian Ocean in the West from the China Sea in the east, its northern half is bordered by Burma in the west north-west, the Lao People's Democratic Republic and Democratic Kampuchea in the north north-east and east respectively. Its most southern neighbour is Malaysia. The system of government has been a democratic one under a constitutional monarchy since 1932. Thailand has had a very long history of political independence.

The last population census was carried out in 1970 giving a figure of 34.2 million inhabitants. The country, which has 71 provinces, is divided into four regions as follows:

(*a*) The northern region, composed of 16 provinces representing 33% of the total area, with a population of about 9.5 million; this region is mountainous and forested;

(*b*) The north-eastern region, comprising 15 provinces (33% of the total area), with a population of 14.5 million; this is the poorest region with problems of inadequate water supply and soil infertility;

(*c*) The central region, with 26 provinces including Bangkok, the capital city, representing 20% of the total area, and containing a population of

12.5 million; this region is flat and the soil is most suitable for agriculture — it is the economic heart of the country; and

(*d*) The southern region, with a population of 5.5 million, comprising 14 provinces (about 14% of the total area); this region is mountainous and forested, and mineral resources and rubber are abundant.

About 45% of the population is below 15 years of age and 6% above 60. The country is predominantly agricultural; 85% of the people reside in rural areas and are engaged in farming or other agricultural activities.

Thailand's economy is gradually changing from an agricultural one to a mixture of agriculture, commerce and light industries. The average per capita income for 1974 as reported by the National Economic and Social Development Council was 5712 baht[1] per year. For the majority of the population, i.e., the 27.7 million who are engaged in agricultural work, the per capita income was 3115 baht per year. For the non-agricultural workers (representing some 15 million people) it was about double that of the farmworkers, i.e., 6314 baht per year.

Of the Government's total budget for 1976, 4% went to the Ministry of Health and 7% to the Ministry of Education.

Thai society is comparatively close-knit, based on family units with several members of the family living together; one household may consist of grandparents as well as nieces and nephews, etc. The average family size is about 6.

There are many cultural practices which are characteristic of Thai people; the young are subordinate to the old, women to men, and laymen to monks and village headmen. With improvements in roads and other means of transport, the influence of the culture of big cities is beginning to spread to rural areas.

EDUCATION

In general, education in Thailand can be grouped into three types:

(*a*) Informal education – i.e., the lifelong process whereby the individual acquires knowledge, skills and attitudes from daily experience and educational influences within his or her own resources and environment.

(*b*) Formal education, which is a structured and graded educational system.

(*c*) Nonformal education—i.e., any organized educational activity outside the established formal system that is intended to serve identifiable learning clienteles and learning objectives. Nonformal education is not new to Thailand. It originated in Bhuddist *wats* or temples many decades ago. This is typical of the indigenous learning system. Efforts are being made to strengthen this system, as it is already in existence in the most

[1] Approx. 20.15 baht = US $1 (1977).

peripheral areas. Another type of nonformal education is that given by youth or cultural clubs and rural training centres. This has been introduced from abroad.

HEALTH

The Ministry of Health in 1972 gave the following figures as adjusted rates per 1000 for:

Live birth rate	40.1
Death rate	10.3
Infant mortality rate	55.0-58.9
Perinatal death rate	10.9-11.6

Common illnesses found in Thailand include those due to infections by microorganisms and parasites and to malnutrition. The main causes of deaths for all ages per 100 000 population in 1972 were:

Accidents, poisoning and violence	48.5
Diseases of the heart	37.0
Pneumonia and diseases of the lungs	36.7
Diarrhoeal diseases	35.8
Tuberculosis of respiratory system	31.8
Malignant neoplasm, all forms	21.9
Malaria	18.1
Malnutrition and avitaminosis	15.8
Diseases of pregnancy, childbirth and puerperium	11.6
Diseases of stomach and duodenum	10.6
Others	818.2

Of total deaths, 16% occurred in hospitals, where identification of cause of death can be regarded as accurate and reliable; the other 84% occurred outside hospitals, mostly in provinces other than Bangkok. According to statistics 85% of babies were delivered at home with minimal or nonexistent acceptable modern medical care.

Health personnel who are recognized officially include physicians, dentists, pharmacists, registered and practical nurses, midwives, dental hygienists, sanitary engineers and laboratory technicians. The numbers of some categories of health personnel in the country in 1972 were as follows:

	Physicians	*Dentists*	*Pharmacists*	*Registered nurses*
Available in country	5 501	719	2 129	16 222
In government service	3 436	425	584	7 954
In State enterprises	138	20	71	370
In municipal institutions	341	52	35	685
In private establishments	339	28	907	749
In solo practice or retired	1 247	194	532	4 864

The health care delivery system with qualified health personnel can be grouped under four categories—namely, those under the Ministry of Health, the local municipalities (under the Ministry of Interior through local government), the Bureau of State's universities (all universities and their teaching hospitals) and private or semi-private organizations.

The main service available, at a comparatively low cost, to the majority of the population is that provided by the Ministry of Health through the following institutions: hospitals in Bangkok; regional hospitals; provincial (district) hospitals; primary health centres; secondary health centres; and midwifery stations.

The pattern of health care provided at the district and regional levels and in hospitals in Bangkok is very much the same—namely, individual curative care (often organ-, system- or disease-oriented), any differences being in degree of specialization, which in turn depends on facilities and specialists available. The availability and degree of specialization vary inversely with the distance from big cities, especially Bangkok.

Typically, each first-class health centre with its satellites, i.e., secondary health centres and midwifery stations, is responsible for providing preventive, curative and promotive aspects of health care to some 50 000 population. The role and function of the health personnel working in the health service complex are defined by the Ministry of Health with clear objectives. The following services are expected to be covered, not necessarily in order of priority: medical care (outpatients, inpatients and referral); maternal and child health, family planning; communicable diseases control; environmental sanitation; school health; laboratory services; medical records and statistics; and sale of government drugs.

Considering the size of the population and the number of personnel available, it cannot be expected that the coverage will be adequate. What then do the Thai people do when they become ill? The results of many surveys may be summarized, in round figures, thus:

51% treat themselves by buying their own medicine
22% attend private medical clinics
11% attend hospitals
8% seek help from traditional healers
4% attend first-class health centres
3% receive no treatment of any kind
1% go to clinics in a town

Obtaining medicine is perhaps the central activity in the Thai medical system. The provider of medical services is called a *moh* (doctor) irrespective of his or her degree or training. In the Western world the standard of medical service is doctor-centred, whereas in developing countries,

especially in Thailand, there are many kinds of medical services within the social-cultural contexts comprising a variegated medical system.

Traditional medicine as used here refers to Thai tradition, which is indigenous, markedly pragmatic and recognized as such. It still remains an important service alternative in its own right. Traditional healers are known by local people as *moh*, or doctor, because the appellation signifies a person who selects and applies or administers medicine to the patient. Under this loose definition and designation one can identify at least 40 types of *moh* in this category— drug-seller doctor, old-fashioned doctor, health station doctor, quack, spirit doctor, dentist, nurse, pharmacist, little doctor, big doctor, holy water doctor, injection doctor, etc.

The traditional pattern of training of these *mohs* is by apprenticeship. *Mohs* do not practise on a full-time basis and some of them provide service without remuneration. Perhaps the only full-time *moh* is the drug-seller doctor.

It is clear at this point that there is an inadequate number of qualified health personnel of all categories as well as maldistribution of those available, especially in rural areas. There are, for example, 500 districts, 258 of which have primary health centres, but there are only 198 physicians and 545 nurses to provide care. The gap between city and town and between town and rural area must be filled, of necessity, by druggists and traditional healers.

Attempts have been made and are being made to train these *mohs* and include them in the health team. They can in many circumstances communicate with the local people more effectively than qualified professional personnel.

At present, the Ministry of Health and Mahidol University are engaged in a joint programme to train traditional midwives, priests and village laymen acceptable to villagers so that they can provide simple primary health care, using Government-approved drugs, carry out prevention and transmit information to health centres.

THE FACULTY OF MEDICINE, RAMATHIBODI HOSPITAL

The Faculty of Medicine, Ramathibodi Hospital, is one of 13 faculties, all related to health sciences, within Mahidol University. Mahidol University was formerly known as the University of Medical Science; the new name was given by proclamation of a Royal Act in March 1969. The history of this University dates back to the foundation of Siriraj Hospital (now known as the Faculty of Medicine, Siriraj Hospital) in 1889, which later was amalgamated with Chulalongkorn University (founded in 1910) and, in 1943, incorporated with the University of

Medical Science as the Faculty of Medicine, Siriraj Hospital. In 1923, the Rockefeller Foundation began its cooperation with the University and medical degrees were conferred on the first group of 18 medical graduates in 1925.

Financial aid from the Rockefeller Foundation came to an end in 1976. An arrangement has been made at the University level to use the Ramathibodi Hospital's income for financial support and maintenance of the programme. This amounts to about US $ 13 750 yearly.

The Faculty of Medicine, Ramathibodi Hospital, was founded in response to the needs of the country to increase the number of doctors and other categories of health personnel within the scope of the second five-year national economic and social development plan of 1967-1971. His Majesty King Bhumibol gave the name Ramathibodi to the Faculty and thus marked its official founding on 1 July 1967. Construction of the buildings, including the hospital complex, began in the same year and was completed for admission of the first patient on 3 May 1969, when His Majesty the King opened the hospital. The cost of construction of the hospital building and nurses' dormitory was approximately US $ 3.7 million.

Ramathibodi Hospital is a 600-bed hospital, well provided with modern medical equipment for laboratory services such as clinical haematology, blood chemistries (multichannel autoanalysis), blood bank, microbiology, immunology, histochemistry, and cytology as well as electron microscopy. The radiology department provides diagnostic and therapeutic services, and nuclear medicine. A unit equipped with data-processing machines is available to handle hospital data as well as research project data. Other supporting facilities include dental, physical and speech therapy.

The Faculty of Medicine, Ramathibodi Hospital, has three main functions: education, service, and research. The educational function consists of teaching programmes for medical, nursing and other health professions, residents and graduates, as well as of providing continuing education to health workers.

In formulating institutional objectives, the Faculty obviously has a responsibility to follow the national policy concerning the education of health personnel. With regard to physicians, the national policy is to train physicians who can function effectively at primary health centres, using available resources. Although this statement is broad, its direction is clear. This is the minimum acceptable competence, since all medical graduates in Thailand have to work for three years in government service; about half the graduates work in remote areas, many of them at peripheral or primary health centres as team leaders. It is with this point in mind that the Faculty has, after careful consideration, adopted the following objectives.

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At the end of clinical years the student should be:

(*a*) Able to collect and analyse data pertaining to problems of patients by such methods as history taking, physical examination and the use of appropriate laboratory aids;

(*b*) Able to diagnose diseases or conditions, especially those commonly found in Thailand, and manage patients with such conditions, as well as cope with patients in acute emergency conditions;

(*c*) Skilful in the use of commonly available medical equipment or instruments for the purpose of treatment and management of patients;

(*d*) Able to carry out health education, preventive and promotive measures to the individual patient, his family and the community, and institute appropriate family planning procedures;

(*e*) Knowledgeable in the field of basic medical and health sciences, public health laws of the country, medical jurisprudence, human relationships, religious principles and socioeconomic matters;

(*f*) Eager to improve his own professional quality by continuing self-education;

(*g*) Responsible for the wellbeing of the community, not only as a doctor but also as a concerned citizen; and

(*h*) Ethical, with high moral values and good professional conduct.

The objectives of the fifth year are that the student should be able to:

(*a*) Describe principles of radiology in diagnosis and therapy, including radiation hazards and their prevention;

(*b*) Describe the mechanisms, pathogenesis and symptomatology of various diseases and recognize, manage and prevent the abnormalities that occur in the following systems: neurological, psychiatric, cardiovascular, renal, pulmonary, haematological, lymphatic, gastrointestinal, endocrine and metabolic, skeletal, dermatological, ocular, otorhinolaryngological and reproductive;

(*c*) Approach both medical and surgical problems in an integrated manner;

(*d*) Perform appropriately during clinical clerkship with patients in wards and outpatient clinics in respect of history-taking, physical examination, problem listing, management plans, progress notes, and patient education, and write records in a systematic way; and

(*e*) Exhibit a good professional attitude.

The objectives as stated above were formulated jointly by staff members of the Faculty and the curriculum committee members who were representatives of the various departments. In determining the objectives, consideration was given to: national economic and social development

planning; the opinions of doctors practising in hospitals, especially at the district level, and observation of their performances; and the opinions of patients, teachers, and students, who spend their elective periods in health centres.

The selection of medical students has been the Faculty's concern ever since its foundation. Selection is done by staff members of the Faculty of Science and the Faculty of Medicine, Siriraj Hospital. One of the criteria used is academic records from the last year of high school. Although the emphasis is not placed on selecting the very bright students, the applicants have been among the top 10% of all high-school graduates throughout the country. Other criteria used are maturity tests, aptitude tests, and interviews to find out the candidates' ability to communicate, to reason, and to explain, as well as their reaction to stress. None of these tests has proved satisfactory as a predictor. Recently, special places have been allocated to bright students who have had their high-school education in rural areas (24 (10%) of Mahidol University's intake of medical students). Normally, these students have very little chance when competing with Bangkok school students. So far, the Faculty is satisfied with their performance during the first year. It is hoped that this programme will continue for 10 years with follow-up. The main purpose is to select those who, upon graduation, are willing to go back and serve their people in their own home towns, i.e., in rural areas. Candidates who cannot afford tuition fees are given scholarships with funds raised by the University and supported by private organizations. In this scheme, the initial selection is done by local people (teachers, district chief, local health officers and the village population).

THE COMMUNITY HEALTH CARE PROGRAMME

To meet the special health needs of Thailand, the Faculty of Medicine, Ramathibodi Hospital, has instituted and attached considerable importance to a community health programme. The Ramathibodi Community Health Care Programme has been designed on the assumption that one or two doctors will be assigned to take charge of the health centre complex and its satellites in a district with an area of 500-600 square kilometres and a population of 50 000. Health care provided for the population will be comprehensive and integrated curative, preventive and promotive, simple care delivered by a team of health workers with the doctors as managers of the team, utilizing limited resources provided by the Government and other resources locally available.

The community health care programme is also designed to be responsible for three functions, namely:

(*a*) Education and training of health personnel medical students, interns, nurses, and other categories in the health team;

(*b*) Health care services; apart from the usual services prescribed by the Ministry of Public Health, the programme attempts to find a new model of health care services which will reach the population at the grass roots level; and

(*c*) Operational research; this will be performed at different levels of the health care organization in an attempt to improve the relationship and understanding between the Ministry of Public Health and the Faculty of Medicine, Ramathibodi Hospital, and to provide more peripheral programmes for the population of outlying areas.

The organization of the programme has not been changed since its inception in 1968. It is still a joint venture of the Ministry of Public Health and an interdepartmental programme in the Faculty of Medicine, Ramathibodi Hospital; a department of social and preventive medicine was not established.

Education and training of health personnel

Medical students, interns, residents and workers in the field receive training in the community medicine programme. A series of four courses arranged in sequence is provided for the medical students, starting from the end of the first preclinical year (year III) and spreading into year IV (second preclinical year), year V and year VI. These courses are:

(*a*) Health and demographic survey;

(*b*) Analysis of community health problems;

(*c*) Design of community health care programmes; and

(*d*) Participation in the ongoing community health care programmes.

The Ramathibodi Community Health Care Programme is health-problem oriented; therefore basic community health science subjects such as biostatistics, epidemiology, health economics and the behavioural sciences are not taught under separate course headings. The learning experience for these subjects is provided extensively when opportunities arise during the course of instruction and whenever problems are encountered.

The three-course sequence—health and demographic survey, analysing community health problems and planning for community health care—is designed to provide the student with knowledge about communities and concepts from epidemiology and statistics with which to analyse community problems, propose solutions and engage in health planning. The fourth course provides first-hand experience for all interns in evaluation of the health care delivery system at national, provincial and district

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levels. Positive attitudes towards community health needs is an important objective of all four courses.

A series of four courses is provided for the nursing students, exposing them to both urban and rural health problems.

Complete coordination of the medical and nursing programmes has not yet been achieved in spite of many genuine and sincere attempts by both sides. The problem is one of logistics rather than one of difference in concept.

A compulsory course of one month is designed for interns, exposing them to health problems as well as organization and management problems at the ministerial, provincial, district and village levels. This course is concerned with the evaluation of the country's health care system.

Residents in their final year (third year of the three-year residency training programme) are required to spend one to three months in the rural provincial hospitals to learn about the health and local situations. Four clinical departments—surgery, medicine, paediatrics, and obstetrics and gynaecology—are sending their residents out for this programme.

A refresher course on community health services in which auxiliary midwives and sanitarians participated was held recently for the medical auxiliaries. The course was arranged by the staff of the Ramathibodi Community Health Care Programme in collaboration with the provincial and Bang Pa-In district health officials. A similar course lasting three to four weeks is being planned yearly for the future.

Flow charts for the diagnosis of common illnesses have been developed for the training of health auxiliaries. The Ministry of Public Health has approved these flow charts and many are being distributed throughout the country. With the use of such flow charts, sanitarians, nurses and midwives at the secondary health centres (satellite centres in the district) are trained to provide simple medical curative care for the villagers in their areas of coverage.

This programme has been expanded to involve secondary health centres in simple curative cases, using the flow charts for common illnesses. Family folders have been made for every household in the villages covered by each health centre. Village communicator programmes have been established in several secondary health centres in an attempt to provide more extensive care for villagers in outlying areas. Simple surgical operations such as appendectomy, herniotomy, exploratory laparotomy, vasectomy and total ligation are performed commonly at primary health centres. Better organization and coordination in the district health care has begun to be realized, as there are now two doctors in charge of the whole district. The new organization of the Ministry of Public Health—integration of curative and preventive services, decentralization of power

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and responsibility—has begun to take shape from the provincial down to the district level.

Workshops on community health

The University of Mahidol committee on coordination of the community health programmes has been established and two workshops on community health, organized by this committee, have been held in the last two years. The Faculty of Medicine, Ramathibodi Hospital, programme staff, as members of this committee, took part in these activities.

The workshops involved faculty members from the six existing medical schools, high officials from the Ministries of Public Health, Education, and the Interior, and from the National Economic Development Board. Participating also in the workshop were Buddhist priests, local health officers and two WHO consultants. The two workshops have helped to promote better understanding among the faculty members of the six medical schools and officials from the various ministries.

The second national workshop's focal point was the fourth national health plan (1976-1981), especially the design of the Faculty of Medicine's curriculum for medical and nursing students to meet the expectations of the Ministry of Public Health's fourth plan.

It was recommended at this workshop that:

(*a*) The job descriptions for medical and nursing graduates prescribed by the Ministry of Public Health should be the main source of objectives of the Faculty's curriculum;

(*b*) The present Faculty's curriculum should be modified and rearranged to meet the above expectation;

(*c*) The programme in community medicine should be spread throughout the whole academic year and every clinical department should participate in it;

(*d*) Faculty members should be assigned to work in rural areas for a period of time in order to acquaint themselves with community rural health problems and local conditions, so as to bring fresh and innovative ideas to the Faculty for the improvement of the learning experience designed for the students; and

(*e*) A permanent committee at high level should be established by the Ministry of Public Health and the faculties of medicine. The practice in the past depended almost entirely on an *ad hoc* committee, the smoothness in running community health care programmes being dependent on personal relationships rather than on sound principles agreed upon by the two high authorities.

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Operational research

The following operational research programmes are still in progress but no evaluation has yet been made:

(*a*) The village communicator volunteer programme (mentioned above);

(*b*) Utilization of flow charts;

(*c*) Hand-sorting punch card for records and statistics; and

(*d*) The establishment of the district committee on health in an attempt to resolve the age-old organizational and administrative defect in the health care organization at the district level.

Community participation

The increase in the number of patients is striking and becoming a problem. Many patients also come from nearby provinces.

One building was donated to the health programme by the community: the chief Buddhist priest of one of the temples in Bang Pa-In has been instrumental in raising the 300 000 baht fund for the building.

ASSESSMENT OF THE PROGRAMME

The programme costs are not excessive; indeed, they are much less than those of some units in a single clinical department.

Each instruction course for medical students is being evaluated for both individual and group performances in terms of the behaviour objectives set up at the beginning of the instruction.

Long-term evaluation of the medical and nursing graduates in terms of performance and attitude towards the rural health services is the crux of the problem in the community health care programme. This type of evaluation has not yet been carried out, since all the graduates have to serve the country under a system of compulsory service for a period of three years after graduation, during which they can be assigned to any governmental post throughout the kingdom, either at the district or at the provincial level. Several positions are available in the teaching hospitals, but the number of applicants for these posts is usually greater than the number of vacancies. About one-third of the graduates seek positions in the Bangkok area, the rest join the government service in the rural areas until the compulsory term is completed. The following figures show the general picture:

Of 65 graduates of 1971 class: 37 are abroad
13 in Bangkok
13 in rural areas
2 whereabouts not known

Of 59 graduates of 1972 class: 31 are abroad
18 in Bangkok
10 in rural areas

Of 63 graduates of 1973 class: 11 are abroad
27 in Bangkok
14 in rural areas
11 whereabouts not known, but not abroad

All of these graduates had completed their compulsory service and could have gone abroad for further training, had they so wished.

Of the 1974 class of 62 graduates, only 4 are studying abroad, 29 hold positions in Bangkok, 24 work in rural areas, and 5, whose whereabouts are unknown, presumably entered group practice.

This finding cannot really be interpreted, but the impression remains that those graduates who have been in the rural areas, whether voluntarily or under compulsory service, and who have not asked for a transfer to other posts are likely to take up permanent posts in the areas in which they are now serving. Many of the graduates are in this category.

A significantly higher proportion of Ramathibodi graduates work as interns in provincial hospitals than the graduates of other medical schools. No claim is, however, made that this provides substantive evidence of the success of the programme.

PERSONAL OBSERVATIONS

In the foregoing pages health problems in Thailand, together with its health care delivery system and health manpower production, have been described. What is being attempted at the Faculty of Medicine, Ramathibodi Hospital, is a model to help to solve problems in remote areas. There are many constraints in terms of manpower, money and material. The method aims to train a new kind of physician, capable of serving in rural areas, very often with no help from other physicians. Emphasis is not so much on actual knowledge, which to many means information; rather, it is placed on methodology, so that the graduates can become their own data processers and operate through pattern recognition. The students are not taught "subjects" but rather what the "subjects" are about. The content of education is guided by what the people need and the roles physicians have to play. The content of education includes clusters of such things as attitudes, values, responsibility and communication skills. By actively participating in problem solving at all stages, beginning with identification, the students are members of the health team from the start.

Impressions gained from letters, and from discussions held and opinions expressed by graduates, students and directors of various hospitals at regular meetings of the Faculty, show that the graduates feel comfortable in the situation that they are being exposed to, having been in a similar situation during their student days.

The fact that emphasis is placed on realistic settings in rural areas, and students and staff members spend at least six weeks in such situations, has gained support from other medical schools in Thailand, which are now sending their students and staff members to rural areas for three to six weeks.

The solution to any health problem must be worked out by the people concerned. No imported model is likely to succeed because there are many factors—socioeconomic, cultural, religious tradition, etc.—inherent in a particular country which are not the same elsewhere and which all play an important part in planning health care delivery. Whatever model is used, it is likely to succeed if started from the grass roots or periphery. There has to be a joint effort involving both local people and the Ministry of Public Health. The University should be involved but not to such an extent that the programme risks becoming too academic. On the other hand if the University is not involved, students will not understand and appreciate the problems and difficulties with which those who give service are confronted.

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CHAPTER 10

SCHOOL OF MEDICINE, HACETTEPE UNIVERSITY, ANKARA, TURKEY: FITTING MEDICAL EDUCATION TO THE NEEDS OF THE COMMUNITY

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EDITORIAL NOTE

Physician maldistribution, quality of training and trends towards overspecialization are major problems in Turkey. This case study provides an example of a medical school's efforts to meet these problems by establishing a Department of Community Medicine. The Department's function is to promote a philosophical commitment to community medicine as a holistic approach to all promotive, preventive, curative and rehabilitative activities acting on individuals, environment and community. The Department seeks to accomplish this mission in part by teaching social sciences, preventive medicine and epidemiology, and in part by conducting clerkship programmes in rural and urban areas in collaboration with other clinical departments. The Department also offers a graduate programme in community medicine.

The quality of care being provided in field training centres has a strong influence on student attitudes, especially when students usually spend most of their time in a well-organized hospital environment. If the centre is a poor example of health care the students may be less interested in a job there than before they came—the exact opposite of the intent of the field experience. A suggested answer to this problem is to establish centres of high quality to demonstrate to students what is possible rather than what is common. This is a very sound approach; it provides an opportunity, however, to raise a perplexing issue. If students are introduced to health professional roles in model care centres established for educational purposes, will they be adequately prepared for the responsibilities they are expected to undertake in centres of the health delivery system?

The population/staff ratios in the teaching health centres are lower than those of health centres in the Turkish National Health Service, but the organization, staffing, and job descriptions of the staff are similar. It was felt essential that the School of Medicine should accept the organizational pattern of the Health Service in establishing its teaching health centres.

In order to maximize the quality of the educational experience obtained by students in a community health centre, the physician workload should be sufficiently limited to allow time for teaching. This would provide students and physicians with the opportunity to interact; at the same time the patient care system must be organized to minimize the disruption this could create.

Health professions schools commonly establish new departments to bring about modifications or augmentation of their goals. The mission of the Department of Community Medicine at Hacettepe University is to bring about a new orientation towards health and medicine by the medical school, its graduates, and the health delivery system of the country.

Educators should, however, recognize that the most important determinant of physician behaviour is not medical education at all but rather the socioeconomic infrastructure of their society.

The Republic of Turkey, established in 1923, is a secular State, though 99% of its population is Moslem in belief. The political system is parliamentarian-democratic and multi-party, and the administrative system so structured as to favour a strong central government. The constitution is based on the principle of "separation of powers" and grants rights of autonomy to the universities, radio and television, etc. The judiciary is independent both of the legislature and of the executive.

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Turkey, with an area of 814 587 square kilometres and a prominently mountainous terrain, is in the nature of a bridge between the Balkans and the Middle East. Although mostly an agricultural country, rapid industrialization has occurred over the last twenty years.

In 1975, the population of Turkey was 41 million; there were 210 cities and towns of more than 10 000 population, of which 22 had more than 100 000 population; there were 36 064 villages with a mean population of 650, most being clustered villages.[1] The population growth rate between 1970 and 1975 was 2.4% per year. Urbanization in Turkey is very rapid. The population of urban centres is increasing by 4% per annum and the percentage of the rural population dropped from 75.8% in 1927 to 58.2% in 1975. The average family size is 5.5 according to 1968 data, with the majority (59%) being nuclear families. Rural families tend to be larger than urban ones.

Education in Turkey is developing at a fairly high pace. Whereas only 4.6% of the women and 17.4% of the men were literate in the age group 6 years and above in 1927, this rate had increased to 41% for women and 69% for men by 1970.

In 1974, the Turkish gross national product amounted to 420 800 million libra (about US $ 30 000 million), and the annual per capita income to approximately 10 900 libra (about US $ 780). According to a survey carried out in 1968, income is maldistributed, the upper percentile of the population receiving 45% of the total. There is also a large income differential between rural and urban populations. The annual per capita income is 8180 libra in rural areas and 26 470 libra in metropolitan areas.[2]

HEALTH

The information on vital events in the country is extensive and reliable. It is summarized below.

In 1966-1967, the death rate was 16 per 1000 and life expectancy was 52.5 years for men and 56.3 years for women. The infant mortality rate dropped from 153 per 1000 live births in 1966-1967 to 110 per 1000 in 1973. The urban maternal mortality rate was 5.9 per 10 000 in 1970.

The major causes of death in different age groups in urban centres in 1970 were as shown overleaf.

[1] Turkey, State Institute of Statistics. *Provisional results of the 1975 census of population*, Ankara, 1975 (Publication No. 739).

[2] Approx. 25 libra = US $1 (1978).

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Infants	*Death rate per 1000*
Pneumonia	109.3
Diseases peculiar to early infancy	68.6
Enteritis	63.2
Infections of the newborn	56.2
Infectious diseases	7.3
1-4 years of age	
Pneumonia	6.3
Enteritis	2.6
Accidents	1.3
Infectious diseases	1.1
Heart diseases	0.5
Nutritional deficiencies	0.2
Over 5 years of age	
Heart diseases	8.92
Neoplasms	2.46
CNS vascular lesions	1.97
Accidents	1.44
Infectious diseases	1.36
Pneumonia	0.57
Cirrhosis of the liver	0.35
Homicide	0.35
Nephritis and nephrosis	0.23
Diabetes	0.23

Malaria, typhus fever, smallpox, trachoma, tuberculosis, and syphilis were the great problems of the past; typhus fever and smallpox have been eradicated, the number of cases of malaria has dropped to a few thousand per year, and similar results have been obtained with the other diseases. The most important infectious diseases at present are food- and water-borne diseases.

Health manpower

The shortage of health manpower is not a critical matter. The physican/population ratio was 1:1948 and the ratio for nurses was 1:2549 in 1975. The serious problem confronting health services is maldistribution of health manpower, especially with regard to physicians and the quality of training and education.

The training of students in medicine and the health sciences is not oriented to the problems of the community. Students are trained to practise in hospitals. Overspecialization is the outcome of this traditional approach. Of the 21 000 practising physicians in the country, 59% are specialists in one or other branch of medicine. There are few female public health or visiting nurses. Male public health nurses and auxiliary nurse-midwives are the most important professional personnel in community work.

Medical education in Turkey goes as far back as 1206, with the establishment of a medical school in Kayseri. The Western system of medical education was adopted in 1827. At present, medical education takes six to seven years and can be started after the completion of eleven years of basic education. Internship is not compulsory and only one school requires rotating internship before graduation.

There are two levels of education for midwives. Nurse-midwives receive four years' professional training after completing eight years of basic education. Auxiliary nurse-midwives are mostly village girls who receive three years' professional training after five years of primary education.

There are three levels of education for nursing, namely: college education, basic nursing education, and nurse-aide programmes. University and college education for nursing takes four years after completion of eleven years of basic education. It is similar to the training of nurse-midwives at other levels. Education for male public health nurses consists only of basic nursing education.

It is strictly illegal to practise medicine without having formal training in medicine. The same is true for assisting births or giving parenteral injections. These laws, however, do not prevent illegal practices of this nature. According to a survey conducted in 1963, 39 731 indigenous midwives and 30 275 needle-men were practising illegally.[3]

Health delivery systems

The Ministry of Health is the organization primarily responsible for the administration and execution of health services in Turkey. The State Planning Organization is the responsible body in the drafting of health planning at the macro level as a part of an overall socioeconomic development plan. The health budget is prepared by the Ministry of Finance. The Ministry of Health collaborates with these bodies in the preparation of the budget and health plan.

Various public institutions, such as the armed forces, the Social Insurance Administration, universities, and state economic enterprises take part in patient care. These organizations employ more physicians than does the Ministry of Health. Their hospital beds constitute about 43% of the total number of hospital beds in Turkey.

Physicians in their private surgeries play an important role in primary care. The role of private hospitals in patient care is limited because only 4% of the hospital beds belong to the private sector.

The main features of the health policies of the Government initiated in 1923 were as described overleaf:

[3] TAYLOR, C. A. ET AL. *Health manpower planning in Turkey. An international research case study*, Baltimore, MD, Johns Hopkins University Press, 1968.

(*a*) The control of disease and the promotion of health was the responsibility of the Ministry of Health and its local organizations. It was delivered free of charge. Unipurpose organizations were established in order to control major health hazards. The malaria eradication organization, maternal and child health centres, and trachoma and syphilis dispensaries are examples of unipurpose organizations. The main local unit was the office of the district medical officer, which served around 50 000 people. Medical officers were responsible for all public health works, judiciary and administrative services, and the ambulatory care of poor patients.

(*b*) Patient care, both at primary and at secondary level, for insured workers, employees of the public sector, pensioners, and the families of these groups, was given free of charge by the hospitals and dispensaries in the public sector. Poor patients were treated free of charge in public hospitals, health centres and the hospitals of the Ministry of Health. Other patients went to private surgeries for primary care. If hospitalized in public hospitals, they paid a nominal fee.

(*c*) Physicians who were employed in the public sector, including medical officers, had the right to practise privately in the afternoons.

The health of the nation improved considerably between 1923 and 1960, but many duplications remained, resources were being wasted, and the health care level was far from satisfactory in many instances. A new programme was prepared in 1960 to nationalize the health services. The programme was accepted by the legislative body in 1961 and it was decided that the new programme should cover the whole country within fifteen years. The main features of the Turkish National Health Services (developed since 1961) and the health plan include: equal opportunity in using health care facilities and services at no charge to patients; no private practice for physicians working in the National Health Services; all health services administered by the Ministry of Health; and integration of all preventive and primary care activities.

The highest priority was given to preventive services, especially to health education of the public. Priority will also be given to ambulatory and home care rather than hospitalization, from which fewer people benefit. Other aspects of the new policy include: home delivery of preventive services—physicians and other staff will visit every village to deliver services and to keep in touch with the people; the promotion of team spirit among health workers; greater responsibility for professional health workers with less training, especially in preventive services; the organization of activities for the continuing education of health personnel; and the integration of health plans with the overall socio-economic plan, which aims to change the infrastructure.

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Health centres, organized in the light of the above principles, each serve an average population of 7000. Each centre is staffed with one physician (the team leader), two public health nurses, and three to five auxiliary nurse-midwives, who are stationed in the health stations or in the health centres. Each auxiliary nurse-midwife serves a population of around 2000, located in three to five villages.

Health centres are connected to the State hospitals and the specialized public health units in the provincial health directorate.

The concept of a national health service has been accepted by every political party as the organizational model for health services throughout the country; at present, the health services are nationalized in twenty-six provinces. The authorities have difficulty in running the services as planned: two major reasons are the vacancies in physician posts, and the lack of proper education for physicians and other personnel—either before they start to work or while they are in service.

SCHOOL OF MEDICINE, HACETTEPE UNIVERSITY

A group of pioneers in medical education succeeded in convincing the the Senate of Ankara University to establish a second medical school in Ankara in 1964. Their objective was to break with the traditional system of medical education and to train community-oriented physicians. This school became the nucleus of Hacettepe University, which was established in 1967.

The curriculum

Medical education originally took seven years. It was divided into three phases: premedical studies, medical studies, and internship. These lasted two years, four years and one year, respectively. Since there was no internship programme in Turkey, the Faculty included it within the medical education programme.

Physics, chemistry, biology, mathematics, statistics, social sciences, Turkish, and a foreign language were taught during the premedical years. Courses in social sciences were two to three credit-hour courses that were given by the department of social sciences of the University. Introductory courses were offered in sociology, psychology, social anthropology, and economics.

Basic medical and clinical sciences were taught during the first two years of medical study. Initially, these subjects were integrated into each course on the basis of systems of the body. Later, the curriculum was changed and anatomy, physiology, biochemistry, and histology were given in integrated courses during the first year, while clinical subjects,

pathology, pharmacology, microbiology, and epidemiology were given in integrated courses during the second year.

The third and fourth years of clinical training were exclusively a clerkship programme. Students rotated in major clinical departments during the clerkship and internship period.

In 1973, the Faculty decided to include in the curriculum of the medical school those courses, with the exception of languages courses, which had previously been taught at premedical college. The new curriculum is as follows:

First year	*Weeks*
Physics, chemistry, mathematics	12
Biology, organic chemistry, statistics	8
Molecular biology, genetics	3
Social sciences for medicine	6

Second year	*Weeks*
Cell biology	6
Tissue biology	8
Cardiovascular and respiratory systems	4
Metabolism	7
Neuroendocrine and reproductive systems	3
Principles in preventive medicine	4

Third year	*Weeks*
Cellular and tissue injury	4
Infectious diseases	7
Cardiovascular and respiratory diseases	4
Diseases of the digestive and haematopoietic systems	5
Diseases of the endocrine and reproductive systems	4
Diseases of the urinary system	3
Diseases of the nervous system and psychiatry	4
Diseases of the musculoskeletal system	3
Family clinics (10 months: one afternoon each month for every student)	

Fourth year (clerkship)	*Months*
Internal medicine	2.5
Paediatrics	2.5
Surgery	2.5
Obstetrics and gynaecology	2.5

Fifth year (clerkship)	*Months*
Community medicine	2
Electives	2
Ophthalmology	1
Otolaryngology	1
Psychiatry	1
Neurology and neurosurgery	1
Orthopaedics, physical medicine and rehabilitation	1
Dermatology	0.5
Urology	0.5

Sixth year (internship)	*Months*
Internal medicine (ward)	2
Internal medicine (outpatient)	1
Paediatrics (ward)	2
Paediatrics (outpatient)	1
Obstetrics and gynaecology	1
Electives	1
Electives	2

The courses and clerkship programme to orient students in community health problems and preventive medicine are described in detail below.

Programme goals

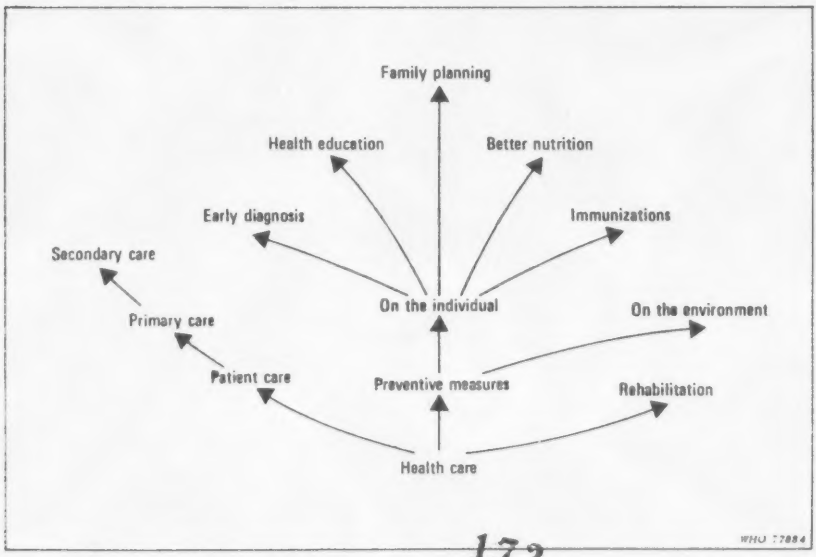
Community medicine has been defined as the art and science of diagnosing community health problems and their causes, where the

objective of community medicine is to secure "the highest attainable standard of health ... of every human being without distinction of race, religion, political belief, economic or social condition" (WHO Constitution). The above definition should therefore be broadened to include all promotive, preventive, curative, and rehabilitative activities acting on individuals, the environment, and the community as a whole in order to conform to the holistic approach of contemporary medicine. This broader definition makes community medicine a philosophy more than an art or science. In fact, community medicine should be regarded as a philosophy. The teaching or practice of community medicine should be the responsibility of everyone concerned with the health sciences. The function of the Department of Community Medicine should be to promote this philosophy and to teach the necessary subjects not covered by other departments.

Teaching community medicine requires the equipment of students with a full and proper understanding of the new content, concepts, and techniques of total health care. The following account provides a concise view of the newly acquired dimensions in medicine:

(*a*) Promotive, preventive, curative, and rehabilitative activities should be integrated and coordinated in medical practice at all levels (see Fig. 1).

FIG. 1. HEALTH CARE



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(*b*) Primary and secondary prevention should be given the highest priority in health care.

(*c*) Health problems should be considered at family, community, country and world levels in addition to the individual level.

(*d*) Man should be considered a part of his environment, the interchange between man and the environment being a complex interacting system consisting of physical, chemical, biological, social and cultural elements.

(*e*) Community surveys have demonstrated that most patients do not go to a physician even when they are severely ill, especially in developing countries. Therefore, all measures such as home service, periodic examinations of persons at risk, and free care should be made available to the people in order to obtain the betterment of the health of every human being.

(*f*) Contemporary medicine is no longer a solo practice. It requires teamwork. The formation of a health team creates new responsibilities for the physician, i.e., providing leadership for the health team and training the team members on the job. The physician's contribution in these matters becomes more vital when some of his functions are transferred to his associates.

(*g*) The pattern of diseases in the community is very different from the pattern in the hospitals. If students are not exposed to practice in the community, they cannot learn what the important diseases and problems of the community are and how to manage their practice.

(*h*) Total health care, which is the implementation of the contemporary philosophy of medicine, requires taking care of individuals throughout their lives, both in health and in sickness. The hospital is not a suitable base for this purpose. Students should observe and participate in the health practices of the community as members of a health team or as clerks in family practice so as to learn how to serve people in health and sickness as well as to learn other aspects of community practice.

The above-mentioned new dimensions in medicine require the addition of the following content area to the curriculum of medical schools:

(*a*) Social science subjects related to health problems and practice at both individual and macro levels;

(*b*) The diagnosis of community health problems;

(*c*) The practice of total health care in the community, i.e., patient care and prevention; and

(*d*) Work in a health team in the community and leadership of a team of health workers.

Traditional medical schools do not teach these subjects, even if they have a department of preventive medicine. The changes in the concept of community medicine have led some schools to establish a new department, i.e., a department of community medicine.

The Department of Community Medicine in the Hacettepe School of Medicine was established to incorporate the new philosophy of medicine into undergraduate and postgraduate medical education. The teaching responsibilities of the staff of the Department are as follows:

(*a*) Teaching social sciences for medicine with the collaboration of the staff of the School of the Social and Administrative Sciences of the University;

(*b*) Teaching the principles of preventive medicine;

(*c*) Clerkship programmes, i.e., family clinics collaborating with the staff of the Department of Paediatrics and the Department of Obstetrics and Gynaecology, rural clerkships, and clerkships in a tuberculosis dispensary; and

(*d*) Postgraduate programme, i.e., a residency programme in community medicine.

The Department has the following facilities: seven health centres and one 50-bed hospital in the Etimesğut rural district; six health centres and one 50-bed hospital in the Çubuk rural district; a well-baby clinic in Hacettepe Hospital; and tuberculosis dispensaries.

The total number of staff is 65; of these, 28 are teaching staff and 32 are residents, the remainder being research assistants.

Teaching social sciences

At the time the School of Medicine was established, courses in social sciences used to be given in the premedical college by the staff of the Department of Social Sciences of the University. Ten years' experience has shown that these courses do not fit the purposes of the School of Medicine. They were similar to the introductory courses for students in the Department of Social Sciences, and the lecture hours were spread between lectures on physics, chemistry, biology, etc., throughout the terms. Medical students following these courses neither succeeded in establishing a link between social sciences and medicine nor acquired a satisfactory basic knowledge in social science as related to health matters. Courses in social sciences were always regarded by students as less important than other courses. The School of Medicine now gives a course entitled "Social sciences for medicine". It lasts six weeks and is

given as a block after the completion of the other first-year courses. The sub-topics of this course are:

Sub-topics	*Total hours*
Sociology for medicine	15
Psychology for medicine	14
Health and economics	14
Population and health	12
Health administration	12
Public administration	7
Medical anthropology	8
Health education	6
Social work in medicine	6
Philosophy of medicine	6
Total	100

Teaching preventive medicine

The course on preventive medicine was first given as a series of hourly lectures, three times per week over one academic year. It was observed that the students were unable to grasp the lecture material satisfactorily. Spreading out the lectures and mixing them up with courses on basic medical sciences, which were more concentrated, had the effect of both diluting the effect of the course and detracting from its importance in the students' eyes. The programme was therefore changed. At present, the course on preventive medicine is given in one block at the end of the second year after basic medical sciences courses are terminated. Emphasis is placed on prevention. The sub-topics of the course are:

Sub-topics	*Total hours*
General epidemiology	12
Health statistics	12
Environmental health	9
Personal hygiene	3
Occupational health	6
Applied nutrition	17
Maternal and child health	25
Mental development of the child	28
Total	112

Teaching epidemiology

General epidemiology is given in the second year during the course in preventive medicine. Epidemiology of the major diseases is given during the third year. The lectures and group discussion on epidemiology are integrated with the lectures on clinical medicine, pathology, pharmacology, and microbiology of the same diseases. A total of 48 lecture hours is allotted to epidemiology. Each student participates in five two-hourly sessions of discussion spread over the year.

Clerkships in family clinics

This is the first clerkship performed by medical students during their training and takes place during the third year. In the family clinics, the students follow the progress of a family in which there is either a pregnant woman or a newborn baby. They are required to observe the health status of either the woman or the infant. They pay home calls, participate in the periodic examinations of the woman or infant each month throughout the academic year, and are asked to write a report about the family and its housing conditions at the end of the year.

Clerkship on practice in the community

Community clerkship in the fifth year is divided into two phases. During the first two weeks, students are assigned to a tuberculosis dispensary. During this period, they also visit factories and discuss occupational health problems with the teaching staff.

The major objectives of clerkship in the tuberculosis dispensaries is to give students the opportunity to observe the problems and life of underprivileged families in cities, to grasp the importance of early diagnosis, and to learn what to do for the early diagnosis of tuberculosis and other diseases. Students also participate in the activities of the dispensary in order to learn the different techniques in the prevention of tuberculosis and in curing patients.

The last six or seven weeks of clerkship are spent in rural health centres under the close supervision of the physician of the centre who is also a senior resident of the Department. A senior teaching staff member is assigned to each centre to supervise the teaching. He visits centres one afternoon every week. Not more than four students are assigned to each centre and they reside in the village during their clerkship period.

During clerkship, students assist physicians in general practice and follow up patients at home. They participate in the work of the maternal and child health nurse, the male public health nurse (who is also responsible for rural sanitation), the auxiliary nurse-midwives, and the medical secretary. They also carry out a community study, usually an epidemiological study, and write a report on their findings.

Ten years' experience has demonstrated that two months of community clerkship is too short a time in which to educate students in teamwork in community practice and to carry out a systematic community study. The Faculty is therefore considering adding a two-month rural internship period for community medicine during the sixth year.

Field training areas

One of the purposes of field training is to teach students how to practise medicine in the community. Students participate in or observe

the activities of a health centre or work with a general practitioner for a given period for this purpose. Although useful, this should not be the only purpose of field training. While working in the field, students should learn how to diagnose community health problems and how to solve them. Field training should also help students to learn how better health care may be given to everyone in the community.

The quality of work in field training areas is crucial in influencing students. To take students from a well-organized hospital atmosphere into a crowded, poorly equipped and understaffed health centre does more harm than good. They usually become discouraged, feel disinclined to get a job at a centre and, besides, learn little or nothing. To work with a general practitioner helps students to learn primary care, but not other aspects of health care. Therefore, special health centres should be established for field training if the services rendered by the existing centres are not satisfactory for training purposes. A well-organized nursing service reaching every home for home care and prevention should be a feature of the centre.

The second criterion is the workload of the physician in a centre. The students should work with the physician in learning how to use the facilities of the centre and how to run all its activities, including the supervision of its staff. This requires that the workload of the physician should not be too heavy and that the number of students working with the physician should not exceed two or three. The physician should be a member of the staff of the School of Medicine.

The duration of field training is also critical. Students are trained for two to three years in the wards of a sophisticated medical centre or at least a well-equipped hospital. They learn and are moulded to work in hospitals; therefore, a visit to a health centre or a short period of work there does not have a significant influence. The period of field training, including training in general practice, should be as long as possible.

The School of Medicine cooperates very closely with the Ministry of Health in the establishment and running of the field training areas where the students spend their community clerkships.

The health centres in the areas were built and equipped by the Ministry of Health. Their standards are the same as in other health centres in the National Health Services. Medical officers of the centres are the senior residents of the Department of Community Medicine and are authorized by the Ministry of Health to run the centres. They do so according to the regulations of the Ministry of Health and report to the provincial health director through the district health officers, who are also staff of the departments. The salaries of the nonphysician staff of the centres and the current expenditure of the centres are covered by the Ministry of Health.

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One of the field training areas, the Etimesğut Health District, was established in 1965. There are seven health centres in this district connected to the Etimesğut Hospital for secondary care, laboratory services, and inservice training. Within ten years, the health status of the population in the Etimesğut District reached a very high level as compared to the standards of the rest of the country.

A new field training area, the Çubuk Health District, was established in the summer of 1975. There are six health centres in this district connected to the Çubuk Hospital for secondary care, laboratory services, and inservice training. These centres were established because of the increase in the number of students in medical school and in order to have a new research area with different problems from those of the Etimesğut District. It is hoped that results similar to or better than those of the Etimesğut District will be obtained in the Çubuk District in the next few years.

The field training areas of the Hacettepe School of Medicine meet the objectives and criteria mentioned above. The health centres are similar to the centres of the National Health Services. Since the Turkish National Health Services are designed in the light of modern trends in health care, students have the opportunity to see a good model of a comprehensive health care delivery system. Health centres are satisfactorily equipped and sufficiently staffed. The workload of the physicians and their connexions with the hospital permit them to give patients satisfactory primary care, to run preventive activities with their staff, and to train students. If the duration of training in the field is extended and the responsibility for one or two students is given to each physician, the quality of training may improve further.

PERSONAL OBSERVATIONS

Redefining the objectives of medical education and changing the curricula of medical schools are much-debated subjects. Is this because medical educators throughout the world have failed to train students satisfactorily in patient care? The answer is no. Training procedures improve every day. Criticism on this ground implies the expectation of perfection. Why then are educators urged to change? It is because some of the needs and demands of society are not being met; and because we cannot see the wood for the trees. Teaching community medicine as described above can be considered as a remedy for the betterment of health care and for meeting the ever-changing and ever-increasing health needs of society.

Can changing curricula in medical schools, and giving students the opportunity of seeing community health problems and of participating in comprehensive health care in communities solve the problem, especially

in less developed countries? This is certainly not possible merely by changing medical education, because the behaviour of physicians is determined by the socioeconomic infrastructure of their society, not by their undergraduate education. The failure of public authorities to create proper health organizations and working conditions in communities also adversely affects the practice and behaviour of physicians. The evaluation of the Hacettepe community medicine programme from the standpoint of community practice supports this fact. As described above, the programme is both satisfactory and more progressive than that of many other schools throughout the world, including the other medical schools in Turkey. A recent study of 172 residents in different hospitals demonstrated that the average score obtained by the graduates of the Hacettepe School of Medicine on the basis of correct answers to a set of questions for determining their orientation to community medicine was 86.4 out of 100. Graduates of other medical schools had an average score of 81.2 out of 100; although lower than the score of the Hacettepe graduates, this score is also quite high.

The efforts of medical schools throughout the world, especially in less developed countries, in the training of students in the holistic approach to health care will be of little value in giving better health care to the public in the near future unless the public authorities prepare the necessary conditions for satisfactory community practice. It would not be an exaggeration to say that public authorities need as much training in this matter as medical students.

CHAPTER 11

THE UNIVERSITY CENTRE FOR HEALTH SCIENCES, YAOUNDÉ, UNITED REPUBLIC OF CAMEROON: TRAINING THE HEALTH TEAM

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EDITORIAL NOTE

This case study describing the development of the University Centre for Health Sciences (UCHS) in the United Republic of Cameroon provides many insights into the complexities of establishing a totally new institution. UCHS is new not only in the sense that it did not exist before, but also in the sense that it embodies new educational, organizational and health delivery concepts.

The goal of UCHS is to educate members of health teams to meet severe shortages of health manpower. The emphasis is to develop and implement a pattern of training to permit the creation of effective health teams. Creating and providing comprehensive health care as a model and conducting operational research are also objectives of UCHS. This very large undertaking involved designing and implementing new educational programmes, a new health care delivery system and new facilities.

The question of what type of curricular arrangements are particularly suited for the education of teams of professional personnel is a difficult one and aspects of the UCHS approach are noteworthy. A common core of courses is taken by students of more than one professional programme, and there are also specialized courses tailored for students of only one professional programme. The most important means for team instruction are practical exercises in the field, which also foster mutual trust and respect and the ability to communicate as the bases for effective team functioning. These capabilities are not likely to be learned in the lecture hall.

UCHS planners felt that a model health care delivery system had to be developed in order to conduct an effective team-oriented educational programme. Not only was a model necessary for training purposes, but characteristics of the model should be adopted by the country in order that the health team education would be consistent with the responsibilities expected of graduates. The UCHS strategy for change then was to create both a new educational system and a new health care system.

In the development period, the instructional programme needed health care centres before they were ready and temporary arrangements had to be made. However well conceived the programme, both students and faculty felt like "guinea-pigs" and the ambiguity of being the first group caused high levels of anxiety. The political stability of the United Republic of Cameroon has, however, been an essential ingredient in accomplishing a comprehensive approach to medical education.

When the wind of change started to blow over the African region, there were only limited facilities for the training of health personnel; many were developed after 1960 (Table 1). On 31 December 1969, only two countries in the region had a physician/population ratio more favourable than 1:10 000; in most countries the ratio was 1:50 000-100 000, and in some it was much less favourable still. The health delivery system was therefore severely understaffed and the scanty health personnel was maldistributed between capital cities and rural areas (Table 2). The situation was further compounded by the fact that the majority of the senior health personnel were expatriate (Table 3) and therefore could not be entered in the national formula for medium- or long-term health planning.

It was against such a challenge that the African health planner started to review national educational plans with the goal of achieving rapid

self-reliance in health manpower for the provision of a healthy life for all the population. Simple multiplication of the then existing institutions for the training of health personnel would have been a poor and slow response to the rapidly evolving expectations of the populations, and in any case the limited output of such institutions was often found to be ill-adapted to national needs. New ways were therefore sought to develop and utilize health teams that are innovative in both structure and function. Experiences in the training of health team members and interdisciplinary education were studied, and areas of successful innovations in education for health were visited, e.g., Brasilia (see Chapter 3).

An early attempt in the region in training health teams was made at the Federal University of Cameroon.

TABLE 1. ESTABLISHED SCHOOLS OF MEDICINE IN THE AFRICAN REGION, 1924-1975

Town and country	Year
Kampala, Uganda	1924
Tananarive, Madagascar	1948
Ibadan, Nigeria	1948
Dakar, Senegal	1949
Kinshasa, Zaire	1955
Lubumbashi, Zaire	1956
Lagos, Nigeria	1962
Abidjan, Ivory Coast	1962
Butare, Rwanda	1963
Dar es Salaam, United Republic of Tanzania	1963
Bujumbura, Burundi (preclinical only)	1964
Accra, Ghana	1964
Maseru, Lesotho (Botswana, Lesotho) [a]	1965
Enugu, Nigeria	1967
Nairobi, Kenya	1967
Conakry, Guinea	1967
Monrovia, Liberia	1968
Lusaka, Zambia	1968
Zaria, Nigeria	1968
Bamako, Mali	1968
Yaoundé, United Republic of Cameroon	1969
Kisangani, Zaire	1970
Ife, Nigeria	1970
Cotonou, Benin	1971
Lomé, Togo (clinical)	1971
Nsukka, Nigeria	1972
Benin City, Nigeria	1972
Niamey, Niger	1972
Libreville, Gabon	1973
Brazzaville, Congo	1975

[a] First two years of medical course.

The United Republic of Cameroon has a long history of paramedical education—beginning with the famous training centre in Ayos, where many medical assistants, nursing aides, technicians, and other field assistants were trained. Some of the graduates of Ayos eventually qualified medically as *Médecin africain* in Dakar (Senegal), and, at independence,

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TABLE 2. COMPARISON OF THE NUMBER OF INHABITANTS PER PHYSICIAN IN THE CAPITAL AND IN THE REST OF THE COUNTRY, IN COUNTRIES OF THE AFRICAN REGION, 1970

Number of inhabitants per physician in the capital	Number of inhabitants per physician (rest of the country)											
	Population	10 000	10 000-19 999	20 000-29 999	30 000-39 999	40 000-49 999	50 000-59 999	60 000-69 999	70 000-79 999	80 000-89 999	90 000-99 999	100 000 and over	Total
	1000	—	—	—	Uganda	—	—	—	—	—	—	Rwanda	2
	1000-1999	—	Gabon Zambia Congo	Botswana Kenya Mauritania	United Republic of Cameroon Sierra Leone	—	—	—	—	—	—	Burundi Niger	10
	2000-2999	—	—	—	Ivory Coast	Malawi Senegal United Republic of Tanzania	—	—	—	—	—	Gambia Togo Upper Volta	7
	3000-3999	Mauritius	—	—	—	Madagascar	—	—	—	—	—	Chad Mali	4
	4000-4999	—	—	—	—	Zaire	—	—	—	—	—	—	1
	5000-5999	—	—	—	—	Benin	Central African Empire	—	—	—	Guinea	—	3
	Total of countries	1	3	3	4	6	1	—	—	—	1	8	27

TABLE 3. PROPORTION OF NATIONAL PHYSICIANS IN COUNTRIES OF THE AFRICAN REGION, 1969

Percentage	Government service	Government service and private practice
0-10	Central African Empire, Chad, Zambia	Botswana, Chad, Zambia, Central African Empire
11-20	Botswana, Gabon, Niger, Congo	Gabon, Kenya, Niger, Congo
21-30	Kenya, Upper Volta	Uganda, Upper Volta
31-40	Burundi, United Republic of Tanzania	Burundi, United Republic of Cameroon, Zaire
41-50	United Republic of Cameroon, Central African Empire, Guinea, Uganda	Guinea, Rwanda
51-60	Zaire, Gambia, Rwanda	Gambia, Senegal
61-70	Benin, Senegal	Sierra Leone
71-80	Sierra Leone, Togo, Madagascar	Benin, Togo, Madagascar
81-90	—	—
91-100	Mauritius, Réunion	Mauritius, Réunion

holders of this qualification were allowed to undertake university medical studies in France.

In 1963, a World Health Organization mission recommended the creation of a school of medicine in Yaoundé. In 1964, two Cameroonian professors submitted a paper recommending the establishment of a multiprofessional university medical centre. During 1965, special commissions, WHO consultants and the United Nations Development Programme (UNDP) studied the matter. Visits were made to other multiprofessional and innovative programmes. Increased emphasis on preventive medicine, tropical diseases, health demonstration zones and new medical educational pedagogy all had their influence. The Cameroonian Government was successful in receiving UNDP funds to initiate the University Centre for Health Sciences (UCHS).

It would seem, therefore, that UCHS in Yaoundé was not a fortuitous development, but a significant step with historical precedents in the United Republic of Cameroon, Africa, and the rest of the world.

THE UNIVERSITY CENTRE FOR HEALTH SCIENCES

The University Centre for Health Sciences (UCHS) was founded in September 1969 as an institution of higher learning within the Federal University of Cameroon. Its programme is directed towards assisting the Cameroonian Government in its efforts to ensure the most appro-

priate and optimum utilization of the health services in terms of both manpower and facilities.

Administrative organization

Organizationally, the academic, professional and technical staff are divided into three technical units, called the Biomedical Sciences, Clinical Sciences/Clinical Practice, and Public Health/Epidemiological Sciences units. They represent the principal groups of attitudes, skills and knowledge that it is desired to impart to students of the health professions. Each unit has responsibilities to teach students of all the health professions. These three technical units comprise one of the four divisions of the University, the other three divisions being academic planning and evaluation, health services delivery, and administration and finance; a division of medical and pharmaceutical research may be added later. The divisional heads report to the Director of UCHS.

The principal disciplines included in the Biomedical Sciences unit are: anatomy, histology, embryology, genetics, physiology, biochemistry, pharmacology, pathology, microbiology and immunology.

The principal disciplines of the Clinical Sciences/Clinical Practice unit are: internal medicine and its major specialities, psychiatry, obstetrics and gynaecology, paediatrics, and radiology.

The principal disciplines of the Public Health/Epidemiological Sciences unit are: health education, evironmental sanitation, community and mass medicine, and health services organization, and related disciplines of the four key areas—sociology, psychology, nutrition, applied parasitology and entomology, management sciences, occupational health, maternal and child health, etc.

Departmentalization for its own sake is avoided, and heads of sections within each technical unit can help the Unit Coordinator in developing the physical facilities, staff and equipment required for teaching, service and research.

UCHS has a number of statutory committees and boards. There are three internal committees presided over by the Director—the School Assembly, the Council of Professors, and the Technical Committee. The School Assembly has no power of decision but its opinions can clearly not be ignored. The membership of the Council of Professors is limited to full university professors and heads of departments; it meets once a month, and may make recommendations to the University Council on appointments, promotions, examination results, teaching programmes and syllabi, general administrative and financial questions, as well as research and service matters. The Technical Committee includes the Director, Deputy Director, heads of divisions, and coordinators of technical units. During the initial transitional period, when UCHS

enjoyed very substantial external financial assistance, the team leaders of the various technical cooperation groups were *ex officio* members. In April 1976, the following were represented: the UNDP/WHO team, the French *Fonds d'Aide et de Coopération* (FAC), the Canadian International Development Agency (CIDA) and the United States Agency for International Development (USAID). The main function of the Technical Committee is constantly to review the objectives of the project and assure a proper coordination of all the inputs from the Cameroonian Government on the one hand and the various technical cooperation agencies on the other. The heads of special projects attached to UCHS (like the international postbasic nursing school) are also *ex officio* members of the Technical Committee.

Apart from the three internal committees already mentioned, there are three other boards or committees which relate UCHS to the Health Ministry, to the University, and to the Government and its collaborating sponsoring agencies.

The Inter-Ministerial Technical Commission deals with any problems that may arise in the relationship of UCHS and the University to the Ministry of Health—the principal employer of health manpower in the United Republic of Cameroon. The University Council is the supreme academic and administrative body in the University in matters of budget, appointments and promotions of academic staff, examination regulations for degrees and diplomas, discipline of students and staff, and any other questions which its members may raise relevant to the life of the University.

The Board of Governors (Directing Council) of UCHS is responsible to the Cameroonian Government and its partners. It reviews the progress of the project every six months and plans for future developments.

Staff development

Teaching staff include full-time and part-time teachers. The full-time staff have grown from only five persons in October 1969 to over 55 in 1976. Cameroonian staff have developed from being a small minority in 1970/1971; in 1974 about 60% of all full-time staff were Cameroonian. How did this rapid growth take place? A staff development programme was launched about 3-4 years before UCHS received its first students in September 1969. With the help of WHO and other sources of finance a number of Cameroonian physicians obtained fellowships to undertake postgraduate studies abroad; some of these returned quite soon and were not, at first, released for teaching by the Health Ministry because of the shortage of specialist medical staff. In 1968, a year before the centre was created, the National Planning Commission reviewed available Cameroonian manpower in this area and identified not only the WHO fellows

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who were in the process of completing their advanced studies but also two Cameroonian professors and two associate professors who were qualified to teach and organize the Health Sciences Centre. To this local talent were added staff recruited and paid for by various technical cooperation agencies—UNDP/WHO, FAC, CIDA and USAID. These agencies have also supported the costs of visiting professors and administrators in a wide variety of disciplines. In addition, funds are available for the advanced training of more Cameroonians so that when international assistance ends (it was scheduled to terminate in 1977) nearly all the major posts will have been occupied by local staff and the institution will be self-supporting.

Full-time Cameroonian staff now include teachers in biomedical and clinical sciences and in public health. Other staff include nurse educators, teachers of laboratory technology, dental surgery (part-time), pharmaceutical sciences (part-time), health administration (part-time), ophthalmology and otorhinolaryngology (part-time), etc. The majority are medical graduates of universities in France and the United Kingdom and of African medical schools (especially Ibadan, Nigeria, and Dakar, Senegal).

Teaching, service and administrative activities are performed in both English and French. Each teacher uses the language in which he is most competent. The students are bilingual and can follow courses in either language. In the six years 1970-1976 recruitment of local staff proceeded steadily—not too rapidly, owing to specialist staff shortage in government hospitals. Shortage of medical manpower has also resulted in a slowing down of the scholarship/fellowship programmes. Fellowships were available but candidates could not be immediately released to take them up.

Part-time staff cover a wide range of disciplines. Qualified specialist staff (clinicians, public health, and biomedical scientists) working in Yaoundé and other parts of the country where students carry out field assignments are recruited as part-time lecturers and demonstrators. They are given an academic grading and remunerated correspondingly. In addition, there is a category of associate staff—physicians in charge of district and provincial hospitals where interns (sixth-year medical students) carry out an integrated medicine internship.

Buildings and equipment

Buildings and equipment are being developed in conformity with a predetermined master plan, drawn up just before UCHS was established and based upon the agreed philosophy. Three major buildings built in close proximity to each other on the University of Yaoundé campus will eventually house the three technical units as well as the activities of

the Community Hospital. The first two were completed and occupied in October 1971 and October 1973 respectively, about 12 months behind schedule in both cases. The Community Hospital building was started in June 1974 (about two years behind schedule) and was expected to be fully operational by December 1977. There is also an administrative building with a library, cafeteria, meeting rooms and amphitheatre annexed to the Biomedical Sciences unit, and completed at the same time. The Community Hospital building will not only house clinical staff, but will be used by all staff (including biomedical and public health) as a base for integrated health care in the neighbourhood district and in satellite health centres in other provinces.

The Biomedical Sciences building is a large complex including eight multidiscipline or multipurpose laboratories (15 students per laboratory —120 student places) and the supporting general laboratories, preparation rooms, store rooms, dissecting room, photographic dark room, and 12 office-laboratory units for the teaching staff. These facilities are used for preparing teaching materials and the teaching of medical and technical students, some service functions (especially histopathology and immunopathology) and biomedical research.

The Public Health building is a base for field activities, teaching and research. It is also a large building with many staff offices, two seminar rooms/reading rooms (about 40-60 students each), a large general teaching laboratory adaptable for basic medical biology, parasitology or elementary medical chemistry, with space for 42 students; a smaller research/demonstration laboratory (12 places) for student research projects, map rooms and a data-processing room. It also has a field office which will be linked with the ambulatory section of the hospital so that follow-up of patients in their homes or villages can be organized.

The Community Hospital

The Community Hospital is a major building, bigger than all the other buildings put together. It is modelled on the usual type of district hospital seen in the United Republic of Cameroon and other developing countries in Africa and elsewhere. The idea is that students receive their basic training in an institution resembling as much as possible one that they themselves are likely to manage early in their professional lives. It is envisaged that both staff and students will also work in other district health centres and provincial hospitals. Undergraduate students will spend some time in these as well as a few short assignments in the more highly specialized neurosurgical/cardio-thoracic and other comparable units at a national reference centre.

Other buildings planned are bed-sitting-rooms for interns, apartments for other staff (including visitors), extension of the biomedical science

laboratories, a teaching block to house a museum, audiovisual aids, more teaching and seminar rooms, offices for the teachers and space for meetings of teaching committees. It is also hoped that hostels will be built adjacent to some of the health centres in the health demonstration zones to house student health team members.

Temporary arrangements were made with the Central Hospital in Yaoundé, pending completion of the Community Hospital, such as appointing UCHS staff as honorary heads of clinical departments and physical plant alterations. It is anticipated that even after the Community Hospital (with 150 beds) has been completed on the campus, the Central Hospital (with 600 beds) will still be needed for training senior medical students, interns and postgraduates.

Financial resources

The principal source of finance for the UCHS project is the Government of the United Republic of Cameroon, assisted by UNDP, WHO, UNICEF, FAC, CIDA and aid from the United Kingdom. The operating budget for 1975-1976 was 210 million CFA francs.[1]

The Government of the United Republic of Cameroon has donated the land for UCHS, and its health ministry has put at the service of UCHS the facilities of some major hospitals and health centres.

The most expensive capital investment of the project is the construction of the Community Hospital on the campus. The Cameroonian Government is paying 900 million CFA francs—half the total cost; the remainder is shared between France and the USA.

UNDP is the major partner of the Cameroonian Government, and WHO is the executing agency for UNDP. In the first four years of the project (1969-1973), UNDP spent over US $1 million.

French technical aid totals over 1000 million CFA francs (April-November 1974). Canadian technical aid includes funds for the construction and equipment *in toto* of the Public Health unit (Can $1 230 000),[2] as well as the salaries of eight teachers of various public health disciplines and scholarships for the advanced training of Cameroonian staff. United States technical aid includes participation in the construction of the Community Hospital (450 million CFA francs), the provision of four teachers (170 million CFA francs), scholarships for advanced training of Cameroonians (about 36 million CFA francs), and scholarships for the training in UCHS of non-Cameroonians (36 million CFA francs). Other assistance includes WHO support for the School of Postbasic Nursing attached to UCHS and aid from the United Kingdom for the medical sub-library and museum.

[1] Approx. 245 CFA francs = US $1 (1977).
[2] Approx. Can $1.07 = US $1 (1977).

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PROGRAMME DESCRIPTION

The programme launched by UCHS is a comprehensive one guided by the following general objectives:

(*a*) Developing and implementing a pattern of training of professional and auxiliary health personnel, sufficiently diversified to permit the creation of effective health teams;

(*b*) Promoting and rendering comprehensive health care to the population of a selected area to be used as a pattern for the whole country; and

(*c*) Undertaking operational research designed, in particular, to obtain continuous evaluation of the health situation and the utilization of health manpower; and cooperating with the responsible planning bodies in developing health plans.

Of these three objectives, all of which are imperative and interrelated, the training of qualified and suitably oriented health personnel has a high priority. In fact, the greatest obstacle in the health sector is the chronic shortage of all categories of health personnel. In order that health action should be effective, not only must there be an appropriate "mix" of health personnel in terms of level and nature of training, but also they must be trained in such a manner that they can adapt themselves for work in rural as well as urban areas; such health action must be properly coordinated; it must be teamwork, not isolated individual efforts.

Teaching programmes

Teaching programmes are aimed at training a wide range of health personnel at all levels. Unlike a traditional faculty of medicine, UCHS is training future medical practitioners (physicians), nurses and various categories of technicians—all these in the context of the health team. Students with different basic academic qualifications pursue courses organized for different types of health personnel, with certain common (or core) courses shared by all students. The emphasis is, however, not on the sharing of courses or lectures in the same classroom but rather on participation by all students in practical team training exercises in the field. The idea is that medical, nursing and technical students have a basic training in their respective disciplines (lectures, seminars, laboratory work, etc.) at the appropriate academic level; they share the same teaching staff, and are taught in the same university buildings. There are certain common courses for students with the same academic entry levels (laboratory, pharmacy, and sanitary technicians, for example). But they all eventually meet in practical clinical and rural community health assignments; a group (or team) of students is assigned to a health

centre from which they undertake to help run the health services for the population (a village or groups of villages). Students thus get a chance to practise their future role and to appreciate the roles of other team members. The team undertakes integrated health care, curative and preventive medicine, as well as community health education. As a consequence of this, teaching is also basically integrated; the teaching of clinical, laboratory and epidemiological aspects of medicine is unified using a series of appropriate themes, rather than being presented as isolated subjects or disciplines (like anatomy, pathology, surgery, public health, etc.). Theme teaching is also very helpful when common courses (or core programmes) are envisaged for students of different health professions, with different academic backgrounds.

Community health service

The creation of a model community health care delivery system is fundamental to the philosophy of UCHS. Such a model could, it is hoped, be reproduced in different parts of the country. Before UCHS was created, six health demonstration zones had been set up (or proposed) in six ecologically different provinces of the United Republic of Cameroon. These DASP zones (*zones de démonstration d'action en santé publique*) are areas where the governmental health authorities, with the assistance of WHO and UNICEF, are attempting to integrate preventive and curative medicine, experiment with new methods of health care delivery, and undertake practical field training and refresher training of nurses and other health personnel. Students and staff of UCHS were then faced with the initial dilemma of how to add their support to the work of the health demonstration zones, none of which was within easy reach of the University campus (where UCHS is based).

The basic philosophy is as follows: the Community Hospital being built on the campus will be the focal point of a network of health centres, dispensaries, and health posts in the adjacent rural Mefou district (population 200 000). It will have a large ambulatory service (general outpatient consultations, mother and child care clinics, etc.) as well as laboratories and surgical support services and 150 inpatient beds (adult, children and maternity). This community hospital is modelled after the other district hospitals which will all be manned, eventually, by the medical, nursing and health technician graduates of UCHS. A two-way flow of patients is envisaged between the community hospital and a network of health centres, dispensaries, and health posts at Mvolye, Mefou and other districts. Total health care delivery—curative, preventive and health education—would be practised in this setting. Beginning at the Mvolye and Mefou districts, where staff practise and students learn the basic elements of their professional attitudes, skills and knowledge,

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students and staff would undergo field training and application exercises in the health demonstration zones, beginning with one zone and progressively, over the years, extending their activities into the others (the Ministry would delegate responsibility for these districts to the Director of UCHS). These demonstration zones are the intermediate or relay stations from which students, when they qualify, will carry the message to other parts of the country. The pattern of integrated health care developed by UCHS in the neighbourhood communities is to be transmitted to the health demonstration zones, where receptivity is expected to be high, and eventually to other districts in the seven provinces into which the country is divided for administrative purposes. It is envisaged that this process will take ten or more years.

In addition to the above role, teaching staff of UCHS will participate in the delivery of health care at provincial and central levels. Internal medicine, general surgery, paediatrics and obstetrics are the major clinical disciplines which contribute to care at the community hospital or district level. Other specialized disciplines in laboratory, clinical and public health specialties will find their place at the provincial hospital, the provincial preventive medicine unit, as well as the provincial medical laboratories. It is inevitable that some of the university professors will run specialized services at the central level—at what would be a national reference centre (the proposed Hôpital général de Yaoundé).

Research activities

The principal research activity of UCHS is a continuous evaluation of the health situation of the country as a whole. This is clearly a major commitment, not to mention other aspects of operational research such as studies of the optimum utilization of health manpower and participation in the development of health plans at the district, provincial and national levels. It requires the full participation of clinical, laboratory and public health specialists. Clinical and laboratory techniques are invaluable for the measurements of health and derangements from "normality"; epidemiological and statistical techniques are indispensable for the planning and evaluation of results. Application of modern laboratory techniques (immunological, biochemical, and biophysical) will be required, as well as sound clinical observation. Sophisticated data-processing techniques should be employed. The essential problem here is to develop the simplest possible methodology that will permit meaningful interpretation of the commonest health indices as a basis for planning the strategy of health care.

Public health specialists at UCHS will be especially concerned with studies of the utilization of health manpower, beginning in the Mefou district and progressing through the demonstration zones to the rest of

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the country. The global appreciation of the health situation by the integrated efforts of all the major disciplines (clinical, laboratory, and epidemiological) will similarly begin in the Mefou district and move from there into the demonstration zones and eventually to the country at large.

In addition to these institutional research obligations, it is inevitable that individuals belonging to the same or related disciplines will be stimulated to undertake research projects related to their disciplines and relevant to national needs. For example, pharmacologists, chemists, and botanists may develop research programmes on the traditional herbal remedies; cardiologists may study endomyocardial fibrosis; haematologists may look at sickle cell disease, etc. These activities may be carried out in the university laboratories and clinics, but also in highly specialized research laboratories under the auspices of the National Research Council.

Detail of the curricula for professional health personnel

Teaching programmes began with the 1969/1970 academic year with the first class of medical students. During the academic year 1976/1977 the spectrum of UCHS educational programmes was scheduled to be completed by the introduction of the courses for nurses and health auxiliaries. Up to then, UCHS continued to collaborate with the Ministry of Health in the organization of refresher courses for health services personnel. By the end of 1977, the following teaching programmes should have been operational:

(*a*) Medical studies—Degree of Doctor of Medicine. Entry—*Baccalauréat* (higher secondary-school diploma) or General Certificate of Education (GCE), Advanced level in science. Six-year programme, first class entered in October 1969; first graduates in September 1975.

(*b*) Postbasic nursing—Postbasic nursing diploma. Entry—state registration plus four years' experience. Two-year programme. First class entered in October 1972; first graduates in June 1974.

(*c*) Health technician programme—State diploma in health sciences, with stated option. Entry—GCE Ordinary level or equivalent. Three-year programme, including courses common to all the options in the first year. First class—with options in medical laboratory technology, sanitary science, pharmacy assistants—entered in October 1973; first set of graduates in 1976. First class with options in physiotherapy, radiography and dental hygiene entered in October 1974; first set of graduates in 1977.

(*d*) Health education—Bachelor of Health Sciences degree, Master of Health Sciences degree. Entry level—*Baccalauréat* or GCE Advanced level with specialization in the humanities plus adequate scientific GCE Ordinary level preparation. First class admitted for Bachelor's degree in

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October 1976. Entry level for the Master's degree—a degree in arts, science or medicine, and an appropriate background. First class still to be admitted.

(*e*) Basic Nursing—state diploma in collaboration with the Yaoundé and Bamenda Schools of Nursing. Entry requirements GCE Ordinary level or equivalent plus language (bilingualism). First two years in the schools of nursing. Third year practical assignments at UCHS and satellite health centres. First class still to be admitted.

(*f*) Health auxiliaries—state certificate in health sciences. Entry level—nursing aide certificate. Further inservice training for 12 months as dental, dietetic, clinical, medical records or medical field assistants, etc. First class still to be admitted.

This range of programmes permits the education and training of a wide variety of personnel in the health team concept, and will thus fulfil the main objectives of the UCHS programme. The team leader, the doctor of medicine, has a particularly rigorous training based upon carefully defined educational objectives which themselves are derived from the task descriptions of a general duty medical practitioner who starts his professional life by taking responsibility for a district hospital. A four-month assignment of "integrated medicine" in the sixth year enables it to be determined whether or not the overall objectives have been achieved. The intern is posted to work in a district hospital in a rural area. Acting as an assistant to the medical officer in charge, he participates in the administration of the hospital, in supervisory visits to satellite dispensaries and health centres, in health education of the public, and health sciences teaching of nursing aides; he takes considerable responsibility for the care of hospitalized patients, supervises nursing staff in the management of outpatients, including maternal and child welfare clinics; he practises surgery and anaesthesia in appropriate cases, and helps to supervise difficult obstetric problems. During the assignment he will perform these duties on a roster basis, so that most of the above activities are carried out on a weekly or fortnightly basis. Ward activities would be daily, surgery about twice weekly, and emergency and weekend duties at least fortnightly.

The integrated programme of medical studies which will enable the student to attain this functional level is as follows:

First year. Introduction to health sciences: basic principles, environmental studies (physical, biological, and social aspects); basic principles of human biology (molecular, cell and tissue biology, structure in relation to function, and population studies); and interaction between man and the environment. Structure, functions and organization of health services—

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local, national, international. Practical assignments in the neighbouring community.

Second year. Human biological studies: integrated study of the human being by organ systems—structure and function of the normal organ (embryological development, histology, biochemistry, biophysics, physiology, and pharmacology) and the common morbid anatomical processes, pathological physiology and the relevant epidemiological aspects. Practical assignments in the neighbouring community.

Third year. Pathological and therapeutic studies: integrated study, based on patients, of the major medical, surgical and psychopathological syndromes, including clinical examination, pathological laboratory and radiological diagnostic methods, and methods of treatment and prevention, including medicosocial and medicolegal aspects. Practical assignments in the neighbouring community.

Fourth year. Integrated health studies: introduction to integrated health care; the individual (basic techniques of medical and surgical management in hospital practice); the family (the practice of family health, obstetric care, maternal and child health protection); the community (organization of basic health team activities in rural communities). Preparation of dissertation.

Fifth year. The basis of general practice: internal medicine, general surgery, paediatrics, obstetrics, psychiatry, and health centre practice. Rotating senior clerkships in appropriate teaching centres. Preparation of dissertation.

Sixth year. Internship: full internship responsibility in the University's Community Hospital unit and in a district hospital with its satellite dispensaries. Presentation of dissertation.

Team training in health demonstration projects

The objectives of the UCHS project in the areas of total health care delivery have not been fully implemented. While awaiting the completion of the UCHS Community Hospital and its becoming fully functioning, team training has been carried out in the Yaoundé Central Hospital as well as in three field projects: a pilot health care project at Mvolye, within the Mefou district, about four kilometres from the UCHS units on the campus; some preparation for the delivery of care to the Mefou district; and health care team exercises in the Mezam demonstration zone in the North-West Province.

The Mvolye Community Health Pilot Project. This project was conceived in 1971, with the following objectives: to provide total health care

for the community; to permit medical students to observe how this may be done; and to permit staff and students to make observations on health matters while providing care. It was five-year project, planned in three phases: a preliminary phase of 12 months (July 1971-June 1972) for contacts with the population and dispensary staff, collection of basic information on the population, and the securing of a suitable base for teaching; an implementation phase during which basic activities would be established, over a period of 36 months (July 1972-June 1975); and a final phase of evaluation 1975/1976.[3]

In January 1972 a full-time physician trained in paediatrics and public health was appointed to head the UCHS activities at Mvolye. The Ministry of Health assigned a nurse-midwife, and other supporting staff were provided by UCHS. Equipment was obtained from UCHS funds and supplemented with UNICEF assistance. During the present phase of implementation the following planned activities are being executed: antenatal and postnatal care; clinics for children under five years of age; school health (in the local primary school); health care of workers (in the neighbouring "industrial" complex); general medical/surgical clinics; family records for selected Mvolye-Efoulan families; vaccination campaigns (measles, triple vaccine, smallpox, etc.); survey of community with the numbering of houses and the drawing of a map of the district; home visits and reports on environmental sanitation; and health education, talks and films in the UCHS annex.

It is in this context that medical and nursing students are initiated into community health. The above activities complement the usual static health centre programmes—routine general consultations, cleaning and dressing of wounds, injections and normal midwifery. It is hoped to merge all these activities into the main Mefou district total health care project when the UCHS Community Hospital is completed.

The Mefou demonstration zone. Beginning in 1973, some clinical and public health staff have carried out surveys of the health centre facilities of the district and there is some useful information on the number of health centres and dispensaries, the quality of their buildings, the number of staff who run them, the quality of these staff (type of training, educational background), equipment and drugs, the volume of work and its nature (the number of patients attending and the reasons for their visits), etc. There is also basic information on the geographic location of the dispensaries and their accessibility at different seasons of the year. Much of this work is an ongoing activity. During the 1973/1974 academic year, postbasic nursing students worked in some of these centres and studied their administration.

[3] The project is now completed in its original form and it is being transformed into a self-help primary health care project for the neighbouring villages.

In the academic years 1974/1975 and 1975/1976, fourth-year medical students and nursing students participated in the work of three health centres at Mefou, Awae and Ngoumou, while fifth-year medical students were assigned in small groups monthly to gather information in other localities. Efforts are being made to link up with similar activities being undertaken elsewhere in Mefou by the Organization for Coordination in the Control of Endemic Diseases in Central Africa (OCEAC) and eventually with the Community Hospital of UCHS.

Bamenda (Mezam) Health Team Demonstration Project. In 1972/1973 and 1973/1974, fourth-year medical students carried out health team exercises in association with postbasic nursing students and student nurses of the Bamenda nursing school. The exercises took place in the Mezam demonstration zone. These exercises, which were suspended for one year, were restarted in the 1975/1976 academic year, when logistic and supervision problems were resolved. Meanwhile, in 1974/1975 similar exercises were organized in the Mefou district near Yaoundé, and these will be the future pattern for fourth-year medical students. Fifth-year students now head the enlarged health teams (including technicians and other health sciences students) in the Mezam demonstration zone. It is proposed to extend this activity to other parts of the country, notably in the Eastern and Northern provinces.

PRELIMINARY REVIEW OF THE PROGRAMME

This is a long-term project aimed at achieving the objectives stated above—training, service and research—but, above all, designed to change fundamental attitudes to health practice and medical education. In this respect, only a preliminary evaluation can be attempted after just seven full years. Nevertheless, it is clear that UCHS has made certain definite impacts on the students, the teaching staff, and the University; and its influence is being felt in the governmental ministries—especially health and education—, in national politics, and among the lay public. It has to some extent influenced other countries in the African region.

A very high proportion of the students are highly motivated to practise medicine and the health sciences according to the new basic philosophy described above. Although many still learn separate subjects, motivation to integrate is clearly evident. They largely agree (there are exceptions) to begin their professional lives at the district hospital level in either the French-speaking or the English-speaking provinces of the United Republic of Cameroon. A new generation of bilingual physicians is clearly emerging; this could have an international impact on the African scene.

The project has brought together medical teachers, Cameroonian and expatriate, trained in a wide range of disciplines from a large number of

countries. The two major groups—English- and French-speaking—are learning mutual respect, and equivalencies between academic qualifications from different countries are being applied (though not without difficulty) in practice. Few of these teachers had experience of integrated teaching and modern pedagogy; many have accepted these concepts and implemented them, and will probably take the acquired skills to their future posts. All teachers have had to face the reality of contributing to the training of physicians (rather than teaching isolated subjects) and combining this with responsibility for training other health personnel. These achievements have not been easy. This spirit of integration has been extended to technical co-operation—members of the Technical Committee have tried to pool the resources of the different agencies, in spite of their varying regulations, and often succeeded. The pooling of Cameroonian and other funds to build the Community Hospital is a fine example of international cooperation.

UCHS, which started in 1969, has helped in transforming the parent University, founded in 1962. Like the other faculties and schools, staff are recruited from a wide range of countries; consequently, regulations which were drawn up to take account of only two traditions—British and French—have been constantly reviewed. The University has had to open its gates a little wider to admit students with "lower" academic qualifications into technical courses (for nursing and technical students) which were previously considered to be outside its terms of reference. This is an example of an institution adapting itself to the needs and realities of the nation.

It is interesting to note in passing that ever since the post of Vice-Chancellor was Africanized, the first Vice-Chancellor and his successor—at present in office—were both selected by the Cameroonian Government from among the medical professors in UCHS.

It is too early to indicate the impact of UCHS on governmental ministries and national politics. Suffice it to say that new institutional arrangements (interministerial commissions) have been set up to facilitate collaboration between ministries for the benefit of UCHS. The Government has awarded UCHS teachers a health services allowance (which covers activities in the laboratory, clinical, and public health fields); and, with this, a challenge has been offered to university professors in other faculties and schools to join the work of national development.

This monetary reward is to encourage all staff members to participate in community development activities in their respective specialties. UCHS is a subject of much public discussion in the United Republic of Cameroon; its failures are widely publicized by its detractors (including some of its staff who are fundamentally opposed to the whole concept).

But it is highly appreciated by the majority; and a motion of support was recently passed in its favour by a supreme political body.

Outside the country, it is interesting to note that a number of African States have recently decided to create university centres for health sciences, faculties of health sciences, or schools of health sciences, using essentially the same philosophy. A large number of visitors come from many countries, and the senior staff are much in demand in international meetings and conferences.

PERSONAL OBSERVATIONS

Difficulties, problems and pitfalls are inevitable in any such project. They fall into three main groups: attitudinal change; organization and management; and leadership and orientation.

How can a whole system be changed within the relatively short period of a project scheduled to last seven years? Firstly, students have problems in accepting and adapting to a new system and their fears of being used as human guinea-pigs were justified until the first graduates were fully integrated into the public service and accepted by the public. It was important, therefore, that students should see tangible advantages in the new system, and their scholastic problems had to be given maximum priority. Planners of integrated teaching should remember that students need the challenge of integrating the knowledge themselves; teachers should provide the conceptual framework of integration, but the rest should be left to the students. Problem-solving exercises in applying the knowledge and skills to real-life situations, including early exposure to patient care, are very important. Large student numbers are difficult to manage in integrated teaching, unless there is adequate laboratory space, and use is made of the newer educational techniques. Students should be encouraged to study in small groups rather than in isolation. They should also be encouraged to have within their working parties students of other health professions, so that the caste system may be replaced by a team spirit.

New staff may be disoriented, unable to grasp the new system, however well it might be described on paper. There are varying interpretations of integration and of the administrative organizational chart, resulting in conflicts between well-meaning and equally well-motivated colleagues. Furthermore, integration calls for a degree of perfection which is not easily achieved among human beings—excellent relations between all staff members.

In the traditional departmental system, the fact that two heads of department do not speak to each other may have little effect on the teach-

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ing programme. If integrated teaching is to succeed perfect humans are not required, but a careful selection of staff is imperative; the creation of teaching and administrative committees largely overcomes "the human difficulty" since decisions can be taken collectively. Orientation of new staff and students by public and private discussions is very important.

UCHS threatens traditional approaches to the teaching of medicine and the established methods of health care delivery. Even those who question the existing systems are not necessarily prepared for a change; change to them means insecurity, and adventure. Should medical education take place entirely within the rigid ivory tower of a university and a university hospital? Should health care be limited to inhabitants of large urban centres, where doctors prefer to live? Should health care tasks be delegated? Decentralization of medical education and practice is vigorously resisted, or dubbed as unrealistic. The first five years after leaving medical school should be planned as carefully as the five to seven years spent in medical school. In the present Cameroonian context, young graduates will begin their professional careers at the district hospital level, so that by the time they are married and have children of school age, they can be posted to towns which have adequate educational facilities. In this respect, the problem of maldistribution of physicians can only be solved in the context of total community development. Integrated health care fits naturally into integrated community development; but it will only become possible when physicians and other people have been trained (as in UCHS) to be equally competent in biomedical science, clinical medicine, and public health. Those who wish to preserve the compartments vigorously oppose the UCHS project.

Good organization and management are indispensable in such a complex project. Discipline is vital. Simple traditional methods of administration will not work. Those responsible for running the project must be specially trained, and refresher courses in management techniques should be organized. Failure to appreciate this has caused many of the difficulties of UCHS. Highly competent, highly motivated professional administrators are needed. They should be flexible, and good at problem-solving.

Apart from attitudinal conflicts in teachers and advisers from several Western traditions, problems of management beset the Yaoundé UCHS. Institutions which recruit their staff from only one administrative tradition (e.g., British or French universities) have fewer problems. The system of administration was strange to many new staff, both Cameroonian and foreign; and this added to their normal academic difficulties. This situation is fundamental to the Cameroonian constitution—bilingualism and biculturalism; so much so that the leaders are obliged to analyse

objectively the systems of British and French administrative practices before adopting one or neither. This situation paradoxically contributed to the success of UCHS since it made an analytic approach imperative. It is therefore recommended that other countries attempting a similar cultural revolution in the health sector recruit professors from as wide a range of countries as possible. But there should be a nucleus of nationals responsible for firm leadership; there should be free and open discussion among competent colleagues, followed by clear and firm decisions. It can be said that management training was given to UCHS teachers in the course of meetings and discussions; perhaps results would have been better if there had been formal training, at least in the form of seminars and workshops.

Unlike traditional institutions with a rigid vertical structure, UCHS has had to evolve its own administrative structure over the past seven years—evolving through three patterns of increasing complexity, but progressively adapted to the major objectives. Management was also complicated by changes in the parent university administration—four Vice-Chancellors within a six-year period.

Leadership and orientation

There are many leadership problems built into a multiprofessional institution; all members of the health team should feel that they belong; there should be no complexes of superiority or inferiority. Teaching programmes and professional services should be organized by the most appropriate professional health workers. A physician should not, within UCHS, run the programmes for nurses or laboratory technicians. The posts of Director and the coordinators of units should not be monopolized by physicians. Those leaders should be highly experienced professional personnel, capable of a wide vision, open-minded, fair, strong, and pliable; and if they plan to accomplish a revolution in health sciences education and health care delivery they should be prepared for shocks and surprises. They should be firm on matters of principle and flexible on matters of detail. One of the major difficulties of the UCHS project has been too strong a desire to succeed, and too much enthusiasm.

Probably the most outstanding contribution to UCHS's successful growth was political stability within the United Republic of Cameroon and an extraordinary degree of maturity in the student population. The Cameroonian Government is often slow to make up its mind about new ideas and philosophies, but when it does, the political leadership sticks to its objectives and gives time for a project to prove itself useful or otherwise. When, in September 1975, the first batch of 29 young doctors graduated in Yaoundé, credit went to WHO and other international and bilateral agencies as well as to the staff and the students. But it was the

unflinching support of the Cameroonian Government that made this possible. Another major difficulty has been the fear, almost pathological, of failure, by the sponsors of the project—especially representatives of international and some bilateral assistance agencies. All participants have tried to do too much and to proceed too quickly with reforms which they are financing. But the leaders of UCHS have had to steer the programme in such a manner that it achieves the desired attitudinal changes without a head-on collision between protagonists of the new and defenders of the old.

UCHS is a higher educational system geared to promote community development, and socioeconomic growth of the Cameroonian nation. A UNDP/WHO evaluation in 1974 reported that most of the objectives for phase 2 (1970-1973) had been attained. The main lesson that has been learned from the growth and development of UCHS is that higher educational institutions should adapt themselves to local realities; that manpower production and manpower utilization are inseparable, that attitudes can be changed but that this process cannot be hurried. The programme should be supported and expanded. Multidonor participation with leadership in the hands of nationals can be a very effective way of achieving developmental goals to the mutual satisfaction of both donors and receivers. The UCHS experience can be recommended to other countries—whether developed or developing.

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CHAPTER 12

COLLEGE OF HUMAN MEDICINE, MICHIGAN STATE UNIVERSITY, AND THE UPPER PENINSULA HEALTH EDUCATION CORPORATION, MARQUETTE, MI, UNITED STATES OF AMERICA:

THE UPPER PENINSULA MEDICAL EDUCATION PROGRAMME

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EDITORIAL NOTE

In response to the worldwide problems of maldistribution of physicians, a hospital-oriented medical education and service, and speciality rather than community general practice, the Michigan State University established a programme of medical education in 1974 which is designed to overcome these disadvantages.

A new form of a regionally based decentralized primary care education programme for physicians was initiated involving simultaneously the development of a comprehensive health care system in the district.

To achieve the objectives, a radical departure from traditional programmes and processes was necessary. A modular curriculum was evolved and, perhaps more importantly, there is considerable emphasis on experiential learning. Students are engaged in a continuous process of providing comprehensive care to 25 families over a period of three and a half years.

It is interesting to note that there has been no development of elaborate facilities (classrooms, hospitals) and that maximum use is made of health practitioners as a learning resource.

Attention has been given to careful selection of students, to the structuring of learning experiences which optimize problem-solving behaviour and the provision of diverse clinical experience.

In many developed countries, the high and rising cost of health care is becoming a major problem. In the United States of America, 12-15% of the gross national product is expended on health care and in the last three years the costs of health care have been rising at the rate of 7-9% per year. The majority of the money expended on health care in the USA is for acute episodic illness, with a very small percentage for preventive care. The ratio of physicians to population is approximately 1:750. Beginning in the mid-1960s, there was a rapid expansion of medical schools as a result of national financing to increase the number of physician graduates. Current projections indicate that problems in the USA are no longer associated with a shortage of physicians but rather with a geographic and specialty maldistribution of physicians. There are high concentrations of physicians in the relatively wealthy metropolitan suburban areas and a shortage in the inner city and rural areas. There is also a general shortage of primary care physicians. There is a growing opinion in the USA, reflected in the activities of national organizations and legislators, that problems in health care are not to be solved by increasing health manpower but rather by major revisions in the health care delivery system itself.

THE UPPER PENINSULA

The state of Michigan is divided into two land masses, the Upper Peninsula and the Lower Peninsula. The Upper Peninsula of Michigan

is approximately 42 700 square kilometres in area and is located about 600 kilometres north of the major population, industrial and economic centres of the state. The Upper Peninsula is nearly surrounded on three sides by the Great Lakes—Lake Superior to the north and Lake Michigan to the south. It has a population of 330 000, the largest city having a population of 26 000. Four other cities in the Upper Peninsula have populations in the 13 000-16 000 range, the remainder of the people being widely dispersed throughout the region in small towns, villages and single family dwellings in rural areas.

During the winter months the average temperature range is −11 to −7 °C. Many areas experience heavy snowfalls of 300-500 cm per year, with some communities receiving 700 cm or more. It is a land characterized by many lakes, forests and hillsides.

Economically, the Upper Peninsula is a generally depressed area with unemployment averaging 14% and reaching as high as 26% in some areas. Major employers in the region are the copper and iron ore mining industries, forest products, tourism and governmental agencies such as education and other social services. Historically, the region has experienced exaggerated swings from prosperity to poverty, directly related to the opening and closing of the mines, governed by the availability of ore, world market prices and new technology. At present, the copper mining industry is practically nonexistent and the iron ore industry is booming. In the field of education, in addition to public education available to all, there are five post-high-school educational institutions, three four-year colleges granting bachelor of arts and bachelor of sciences degrees and two technical or community colleges offering two-year programmes. The total student enrolment in these five institutions is 17 000, many of them residents of the urban centres of the state of Michigan.

HEALTH

A higher percentage of the population in the Upper Peninsula is in the 60+ age bracket than in the state of Michigan generally, resulting in a significant need for geriatric care of chronic illnesses. The major causes of death are accidents, heart disease, cancer, vascular lesions, infectious pneumonia, and cirrhosis of the liver. Infant mortality is 13.4 per 1000 live births.

There are approximately 240 practising physicians in the region, giving a physician/population ratio of 1:1400, as compared with 1:800 for the state of Michigan as a whole.

More than 50% of the physician specialists are concentrated in Marquette, the largest town. Nearly 30% of the physicians in the Upper

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Peninsula are 60 years old or more. There are 18 hospitals in the region, the majority of them having fewer than 50 beds. The two largest hospitals are in the 200-300 bed range, with one hospital serving as a regional referral centre.

In general, the Upper Peninsula is experiencing the two problems most common to rural areas in the USA—an insufficient number of primary care physicians and an uncoordinated health delivery system.

INSTITUTIONAL ARRANGEMENTS

Michigan State University is a state-supported institution of higher education with an enrolment of approximately 44 000 students. Located in East Lansing in the lower central part of the state, it offers bachelor, masters and doctoral degrees in a wide range of fields. In the health area there are schools of medicine, osteopathic medicine, veterinary medicine and nursing, along with programmes in medical technology, social work, nutrition and other fields related to health.

The College of Human Medicine was founded in 1966 as a two-year medical school and expanded to a full four-year M.D. degree granting programme in 1968. The first class of students graduated in 1972. In 1976 enrolment at the College was 400. Since its inception, the medical school has been committed to a community orientation and to finding new and improved ways of educating medical students. Instead of having a university hospital or a local hospital under its control for clinical instruction, the College established six regional campuses, five in communities within a radius of 115 kilometres from the main campus and the most recent one established in the Upper Peninsula. Except for the medical education programme in the Upper Peninsula, students receive the first two preclinical basic science years at the main campus and then transfer to one of the five regional clinical campuses for the remaining two years of training. Students are generally admitted to the College of Human Medicine after having completed four years of post-high-school general education, including the basic subjects of chemistry, physics, biology and social sciences. After completion of four years of medical school, graduates receive their M.D. degree and must go on to a minimum of three years' residency training, although a licence to practice can be obtained after one year of internship.

Administrative organization

The Upper Peninsula medical education programme is jointly conducted by Michigan State University's College of Human Medicine and the Upper Peninsula Health Education Corporation. This atypical organiza-

tional arrangement is one means by which principles of cooperation between the large university and the people of the region are being promoted, in that it encourages responsiveness and accountability to the Upper Peninsula. The state of Michigan channels financial support through both Michigan State University and the Upper Peninsula Health Education Corporation, thus vesting both agencies with the legislative power to conduct the Upper Peninsula medical education programme. In this way there is shared responsibility and accountability at the same time as a division of responsibility. Michigan State University's College of Human Medicine has primary responsibility for the planning, implementation and evaluation of the educational components of the programme. The Upper Peninsula Health Education Corporation is the administrative entity providing regional input. Its role is primarily to provide the physical facility, administrative support staff, and educational and clinical equipment, as well as to assume the responsibility for the patient care in the model comprehensive care centre and to serve as evaluator of the needs of the region. A nineteen-member board of directors of this non-profit-making corporation provides regional representation from the whole Upper Peninsula by bringing together knowledgeable persons in the areas of medicine, hospitals, educational administration, public health, and the community at large. While Michigan State University admits the students, the process involves both the Upper Peninsula regional representatives and the teaching Staff of the College of Human Medicine. The Upper Peninsula medical education programme faculty members are reviewed by both entities and the curriculum has been developed through a process that reflects regional as well as University perspectives. Decisions in the areas of admissions, curriculum, recruitment of teaching staff, ambulatory care planning and fiscal matters reflect the interests of both the medical school and the region. It must be stressed that although the programme is geographically distant from the medical school it is not free-standing and autonomous. It is an integral part of and dependent upon the medical school's resources and procedures for assuring educational quality.

THE MEDICAL EDUCATION PROGRAMME

In 1974, the College of Human Medicine at Michigan State University, in cooperation with the Upper Peninsula Health Education Corporation, established the Upper Peninsula medical education programme to improve the quality of health care in the region by increasing the number of professional health workers and establishing a model system for the delivery of primary care and primary care education. The first phase of

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the programme concentrated on the education of physicians; the second phase, beginning in July 1977, consists of expanding the model primary care delivery system, conducting a family practice residency programme and training other categories of professional health personnel. The programme is designed for 40 medical students, 10 per class. The first class of 10 was scheduled to graduate in the spring of 1978.

For approximately three and a half of the four years of predoctoral education, medical students are located in the remote Upper Peninsula of Michigan, about 600 kilometres from the main campus. Throughout the four years of predoctoral education, the main setting for learning both basic and clinical sciences is a specially designed comprehensive primary care unit.

Programme rationale

Geographic and specialty maldistribution of physicians in the USA has received increasing attention in the last few years. Public concern has brought forth new federal health manpower legislation intended to deal with the problems. Studies have been conducted to determine factors which influence a physician's choice of specialty and practice location. Community of origin, income potential, degree of professional isolation, location of residency, and other educational experiences are among the factors influencing the choice of a practice location that are most often cited.[1-4] Studies of the relationships between personal characteristics and choice of specialty suggest that students who are older will be more likely choose to practise primary care in rural areas.[5,6] There is also evidence of a relationship between specialty choice and practice location, in that primary care physicians are more evenly distributed between rural and urban areas.[7] Admissions criteria, characteristics of the predoctoral curriculum, and the relative isolation of academic medical centres from communities are seen as negatively influencing the choice of primary care practice or practice in rural areas.[8,9] Very few medical schools, for example, are known to include community of origin as a

[1] BIBLE, B. L. Physician's view of medical practice in nonmetropolitan communities. *Public health reports*, 85 (January): 11-18 (1970).

[2] HELD, P. J. *The migration of the 1955-1965 graduates of American medical schools*, Berkeley, University of California, 1973 (Ford Foundation for Research in University Administration, Paper P-35).

[3] STEINWALD, B. & STEINWALD, C. *The effect of preceptorship and rural training programs on physicians' practice location decisions*, Chicago, American Medical Association, 1973 (Research paper, revised 1974).

[4] YET, D. E. & SLOAN, F. A. Migration patterns of recent medical school graduates. *Inquiry*, 11 (June): 1974.

[5] LYDEN, F. J. ET AL. *The training of good physicians*, Cambridge, MA, Harvard University Press, 1968.

[6] SCHUMACHER, C. F. Personal characteristics of students choosing different types of medical careers. *Journal of medical education*, 39: 278-288 (1964).

[7] COOPER, J. ET AL. The decision for rural practice. *Journal of medical education*, 47: 939-944 (1972).

[8] LONG, E. *The geographic distribution of physicians in the United States*, Minneapolis, MN, Interstudy, 1975.

[9] BREISCH, W. F. Impact of medical school characteristics on location of physician practice. *Journal of medical education*, 45: 1068-1070 (1970).

criterion for admission,[10] even though there is evidence that physicians are more likely to settle in communities similar to the ones in which they lived prior to entering medical school.[8]

Cooperative medical school community programmes providing opportunities for physician contact with medical schools and access to continuing education are also likely to influence the choice of practice location.[11] The number of physicians choosing to practise in rural areas could therefore be increased by establishing medical school/community educational programmes in rural areas, such as has been envisioned in the area health education centre concept.

The possible relationships between characteristics of medical education and geographic and specialty maldistribution were considered by programme planners. They made several observations that subsequently influenced the character of the programme. The nature of predoctoral medical education does not encourage graduates to pursue primary care practice in underserved rural areas. Medical education provides all students, regardless of their future specialty, with generally the same predoctoral education on the basis that there is a common core to all medical specialties. This common core understandably reflects the subspecialty and research orientation of medical school teaching staff and the academic medical centres within which they work. As such, predoctoral medical education has offered little opportunity for students to learn continuity of care, ambulatory care, how to deal with the undifferentiated symptom, or when to hospitalize and make referrals, to name a few examples. What is taught in predoctoral medical education, therefore, is not common to all specialties but only to the hospital-based aspects of specialty medicine to the exclusion of primary care specialists. Because medical student instruction occurs in a technology-intensive, subspecialty-oriented environment, students may acquire a perspective on their future roles as a physician that is difficult to fulfil by practising in small, more remote communities. It was concluded that in order to maximize the impact of medical education on improving health care in a given region: (*a*) admissions procedures should be established that take into account factors associated with the choice of primary care practice in rural areas; (*b*) the educational programme should include an emphasis on the activities of primary care physicians and the health care needs of rural areas; (*c*) the process of medical education should be integrated with the delivery of comprehensive primary care; and (*d*) the programme

[10] MADISON, D. L. Recruiting physicians for rural practice. *Health services reports*, **88** (No. 8): 758-762 (1973).

[11] COLEMAN, S. *Physician distribution and rural access to medical services*, Santa Monica CA, The Rand Corporation, 1976.

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should be conducted cooperatively with the region and should be constructed to include the specific health care problems of the region.

The curriculum

The curriculum for the Upper Peninsula medical education programme integrates medical education and the delivery of comprehensive care. In some respects it is an extension of the community-based, integrated, problem-based and self-learning principles that guide the curriculum planning and implementation at the College of Human Medicine. After three years of special curriculum development for the Upper Peninsula programme, an alternative small-group curricular track for the first two years of medical education was established in 1974 for students in the regular programme of the College and became the basis for the first two years of the Upper Peninsula curriculum implemented in 1975.

The curriculum for the Upper Peninsula programme has several notable characteristics. The decisions regarding the content of the curriculum are influenced by the characteristics of remote area primary care practice, as well as by the basic knowledge and skill that any physician must possess. A specially designed comprehensive primary care unit located in the region is the primary setting for both basic and clinical instruction.

Much of the students' clinical training focuses on continuing comprehensive care rather than on acute episodic hospital-based care. The content and skills of medicine are designed to be learned through the process of medical problem-solving. Basic science and clinical instruction are integrated across academic and specialty disciplines.

The curriculum has three phases: an introductory phase in which the student becomes oriented to the processes of medical education and the medical profession (10 weeks); a phase synthesizing basic biological and behavioural sciences with clinical training and problem-solving skills (60 weeks); and a phase comprising the third and fourth years in which the students concentrate on learning and refining their clinical skills in problem-solving in comprehensive primary care and hospital environments (60-80 weeks).

Phase I. Phase I in the Upper Peninsula programme offers an introduction to medicine. This ten-week experience, the only portion of the instructional programme located at the main campus, is designed to capitalize on the entering student's excitement about medicine as a career. The primary goal is to provide students with an introductory overview of medicine, emphasizing the interrelatedness of its biological, social, and clinical components as well as opportunities to learn how these components relate to the knowledge and skills of the physician. Phase I

also introduces the concept of focal problems,[12, 13] a small-group, clinical, problem-oriented approach to instruction that is the predominant instructional mode during Phases I and II. During this first stage, students generally study two problems, such as sore throat and alcoholism. Considerable attention is devoted during Phase I to the group process and dealing with student anxieties associated with being in medical school and being confronted with unfamiliar educational techniques. Other courses in Phase I are introductory physiology, patient interaction, and electives.

Phase II. Phase II requires the learning of basic biological and behavioural science concepts, observational and perceptual skills, biomedical problem-solving, health care delivery concepts, and human growth and development. Course work consists of focal problems, anatomy in physical diagnosis, a continuation of the patient interaction sequence started in Phase I, introduction to comprehensive care, and a community/clinical experience.

A sequence of 14 focal problems has been specially designed with two to three clinical cases per problem so that the basic biological and behavioural science concepts (usually taught in lecture courses in physiology, pharmacology, microbiology, etc.) are learned while clinical problem-solving abilities are emphasized. Instructors serve as resources for the students working in small groups and individually by being available to respond to questions and provide guidance, as well as plan content and assess student performance.

The focal problem course is augmented by a community/clinical experience that introduces students to patients with illnesses associated with the problem they are studying, as well as introducing them to the broader context of health and health care in rural communities. The patient interaction sequence uses trained "patients" and discussion prompted by review of video tapes to help the students to learn to relate to patients. The anatomy course emphasizes topographical, gross internal and neurological anatomy along with basic physical and interpersonal skills during the examination. In the introduction to comprehensive care course, students devote two to four half days per month in the model comprehensive care centre making initial contacts with the patients and their families, with whom they will be associated for three and a half years.

Phase III. A notable characteristic of the Upper Peninsula curriculum is that the majority of the students' education relates directly to compre-

[12] WAYS, P. O. ET AL. Focal problem teaching in medical education. *Journal of medical education*, 48: 565-571 (1973).
[13] ECHT, R. & CHAN, S. W. A new problem-oriented and student-centered curriculum at Michigan State University. *Journal of medical education*, 52: 681-683 (1977).

hensive ambulatory patient care. This comprehensive care serves as the mechanism for integrating students' learning across clinical specialties similar to the way in which focal problems serve to integrate students' learning of the basic sciences. The educational requirements for students in Phase III of the Upper Peninsula programme are defined by the clinical departments and are the same as those for other students of the College enrolled in required hospital-based clinical rotations. Students in the Upper Peninsula programme are also expected to fulfil additional objectives associated with comprehensive care and social sciences. The manner in which they meet their educational requirements, however, differs considerably from the approach used by students in the regular programme. Phase III in the Upper Peninsula curriculum has three basic elements: a 36-week, three-term, comprehensive care clerkship; a 12-week hospital care clerkship; and a minimum of 12 weeks of electives, six weeks of which must be taken in a large metropolitan medical centre.

The 36-week comprehensive care clerkship is the primary mode for students meeting the departmental clerkship requirements for obstetrics and gynaecology, surgery, paediatrics, medicine, and psychiatry, as well as objectives in family practice and a behavioural science course on the social context of medicine. Several considerations led to this integrated, comprehensive care oriented approach to clinical training. An analysis of what primary care physicians do suggested that clinical education should emphasize continuity of care to individuals in the context of their family and living circumstances, and deal with undifferentiated symptoms, frequently encoutered by primary care physicians prior to hospitalization. Also, a review of each of the required clerkships by representatives of the College's clinical departments indicated that a majority of the stated objectives of obstetrics and gynaecology, paediatrics, surgery, medicine, and psychiatry were common to all of the specialties and, further, that most of the objectives could be learned by students in a comprehensive primary care setting. Finally, it was determined that small hospitals common to rural areas do provide the range and frequency of medical illnesses, with a few possible exceptions, for students to meet the objectives, if they spread out their learning of the basic clinical specialties over 36 weeks, rather than concentrate their instruction in four- to ten-week blocks.

The 36-week comprehensive care clerkship is team-taught by an obstetrician/gynaecologist, surgeon, paediatrician, internist, psychiatrist, two family practitioners, and a sociologist. Teams composed of three students and one family physician provide patient care to a panel of families, many of whom they have followed since their first year of medical school. They see patients in the model primary care centre three and a half days per week, attend hospital rounds each morning, at which

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time students present interesting cases from the centre or other hospitalized patients. They devote one day per week to a formal seminar and discussion of cases, one day per month each to obstetrics and gynaecology, surgery, psychiatry, paediatrics, medicine, and the social context of medicine. During the course of one additional day each week, on a rotating basis, one of the specialist instructors observes students caring for patients of his specialty and provides feedback to the students.

The 12-week hospital care clerkship provides students with an in-depth experience in and responsibility for the care of seriously ill hospitalized patients. It gives students the chance to become acquainted with the diagnostic and patient management styles of a variety of medical specialists, as well as offering them an opportunity to meet their specific educational requirements in a medical care setting served extensively by a wide diversity of specialists. It also helps students to develop an understanding of the hospital care resources and personnel required to enable comprehensive primary care physicians to manage the team members in such a way that the patients' needs are most effectively met.

Electives for the Upper Peninsula programme are conducted as in other programmes of the College of Human Medicine. Electives, which occupy approximately one-third of Phase III, provide students with the opportunity to explore areas of medicine of personal interest, and to improve their knowledge and skills where these may be deficient.

Admissions

The admissions process for the Upper Peninsula medical education programme is designed to maximize the chances that the graduates will practise primary care in the Upper Peninsula region. To accomplish this, the criteria used for selection emphasize community of origin and other ties to the region such as attending undergraduate school there, a concern for the health needs of the Upper Peninsula and a commitment to primary care, along with evidence of academic ability. Fully aware of the enormous difficulties associated with predicting the type and location of applicants' practice—something that will take a minimum of seven years to materialize—the College of Human Medicine appoints a special admissions committee composed of primary care physicians, educators, professional health personnel, consumers from the Upper Peninsula and representatives of the College's regular admissions committee on the basis that committee members tend to be attracted to persons of their own kind. During the first two admissions cycles, the chairman of the regular admissions committee served as chairman of the Upper Peninsula admissions committee.

Faculty members

The Upper Peninsula – based staff of the programme consist of a core of part-time and full-time instructors, the equivalent of six full-time staff representing basic biological and behavioural sciences and clinical specialties. In addition, clinical and basic science instructors of the College of Human Medicine, based either at the main campus or at one of the other regional clinical campuses, travel regularly to teach, to plan and to evaluate the programme, the students and the patient care provided by the model unit. The staff based in the Upper Peninsula, of whom some are in private practice and others are full-time salaried employees of the medical school, are reviewed for regular faculty appointments in the College of Human Medicine. They are selected both for their professional credentials and for their ability to participate in a medical education programme that differs greatly from the one which they attended.

A programme of teacher development is regularly conducted, employing several kinds of group processes to improve the instructors' abilities to work together, using various techniques and engaging in self-assessment and programme evaluation.

Facilities

No new buildings have been constructed for the programme. The primary facility for both basic and clinical instruction is a specially designed primary care unit that is both a teaching and an ambulatory care centre. It is located in space leased by the programme and modified for its use. One wing of the centre houses patient consultation rooms and the second wing houses instructional rooms complete with audio-visual equipment, study space, a library, and laboratory facilities. Four community hospitals in the region are used for clinical instruction, a 130-bed hospital located in the same town as the primary care centre, two 40-bed rural hospitals each about 95 kilometres from the primary centre, and a larger 300-bed specialty referral hospital about 110 kilometres to the north. Larger hospitals outside the region offer specialty electives.

EVALUATION

Students in the Upper Peninsula programme must meet the same graduation requirements as students in the regular programme of the College of Human Medicine. The system used to evaluate the performance of students in the Upper Peninsula programme is for the most part the same as the system used for students in the regular programme.

The formal evaluation of student performance is divided into four parts: an entry assessment at the beginning of Phase I, then Phase I, II, and III evaluations. The entry assessment offers a profile of each student's characteristics including some pretests on reading and writing abilities, the Myers-Briggs Inventory on personality characteristics, and a psychological profile. Phase I evaluation, an upgraded experience, is constructed in a paper case clinical problem format (providing statements for students to work with, ultimately forcing them to make some choices and decisions about diagnosis and treatment, thus demonstrating the student's ability to synthesize knowledge). Phase II evaluation consists of multiple choice content examinations, problem-solving cases and patient-management simulations, self-assessments, group assessments, and ultimately a pass/no pass decision regarding the entering of Phase III. At the end of each term a comprehensive report is prepared on the student's progress that term. If the student does not achieve satisfactory progress in the categories of content knowledge and problem-solving abilities, a remediation programme is devised.

The student evaluation system for Phase III assesses basic content knowledge, problem-solving skills, patient-management abilities, and the skills of self-assessment. Content examinations are administered regularly covering each basic clinical specialty. Clinical abilities are assessed by reviewing students' patient write-ups, and by observation of their work with patients. On a regular basis representatives of the clinical departments conduct oral examinations. A student learning record allows students to record daily the types of medical problem that they have seen and the degree and nature of student involvement. The students continue the self-evaluations started during the first year by constructing and maintaining a personal educational problems and strengths list and keeping "learning" progress notes.

Formative or process evaluation procedures involve questionnaires to obtain the opinions of teaching staff and students at 12-week intervals. At the end of each 12-week period, staff meetings are held with a portion of time devoted to identifying problems and according them an order of priority. A longitudinal study of the medical student professionalization is being conducted from entry into the programme up to the end of the first year of practice. The study is intended to evaluate the ways in which the students acquire a personal perspective of their role as a physician and the impact of the educational programme on that perspective.

The extent to which the programme has influenced health care in the region or increased the number of primary care physicians choosing to

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practise there cannot yet be determined. The following observations can, however, be made:

(*a*) In basic science knowledge, problem-solving skills, patient-management abilities, self-assessment skills, basic data collection, and physical-examination skills there is no significant difference between the performance of Upper Peninsula students and students in the regular College of Human Medicine programme.

(*b*) Most observers find Upper Peninsula students more self-confident in relating to patients than students at comparable levels in other programmes.

(*c*) When the comprehensive primary care setting is the main location for medical education, students learn what is traditionally expected of them in hospital rotations plus the skills associated with providing continuous care.

(*d*) To date, seven of the ten students in the first graduating class chose a primary care residency (four in family practice, one in internal medicine, one in paediatrics, and one in obstetrics and gynaecology).

(*e*) All ten students indicate that they intend to practise in a rural area (seven in the Upper Peninsula).

(*f*) Students, instructors, patients, community leaders, and physicians support the programme.

(*g*) Since the programme was introduced, five physicians have started practice in the town in which the programme's primary care/teaching centre is located, all of them indicating that the programme's existence influenced their decision.

(*h*) By 1981, the programme will provide direct care in the form of at least 55 000 patient visits per year, a service which was not available to the region before the programme started. This does not include services to be provided by graduates of the programme or by physicians attracted to the region because of the programme. These latter services cannot yet be accurately projected.

Summary of problem areas

Experience to date has provided insight into what are or may become programme weaknesses. One area of weakness is the extent to which the particular health needs of the people of the region are taken into account in the curriculum. Even though locating the educational programme in the region has significantly influenced what students learn about the health needs of the region's population, more can be done.

Another potential problem area is the stress to which the programme's physician instructors are subjected in fulfilling teaching duties and providing medical care. The programme was located in an underserved area,

which, by definition, means that the need for services in that area is not being adequately met. Physicians brought to the area for the educational programme must be protected from excessive patient care demands in order for them to have time to teach medical students.

A third potential problem area is the availability of a sufficient range and frequency of medical problems in rural communities to permit students to obtain a well-rounded, in-depth medical training. Thus far, the evidence indicates that there are enough medical problems in existence to ensure good-quality medical training if the curriculum is properly organized. The exception to this generalization has been in the field of paediatrics. Because of the very small number of paediatricians in the region, the opportunity for students to participate in caring for seriously ill hospitalized children has been inadequate. Even this deficiency, however, appears to be diminishing with the influx of more paediatricians into the area.

One other potential problem area should be mentioned: possible overemphasis of clinical and practical skills as opposed to basic, more scientific knowledge. In our judgement, the curriculum properly emphasizes the acquiring of knowledge and skills that will be most useful to physicians. This must be done, however, without limiting students' knowledge of basic concepts and principles which, although not frequently relevant to everyday clinical work, will enable them to form a general notion of how to deal with problems not encountered in their training.

The advantages of the integrated approach to teaching both basic and clinical subjects in the Upper Peninsula medical education programme have been noted earlier in this chapter. It should also be pointed out that during the developmental stages, cross-disciplinary instruction requires considerable instructor effort. More time, for example, must be devoted to planning instruction and ways of assessing student performance, since consensus must be reached among the representatives of several disciplines rather than just one. Because of the amount of time and effort that instructors must put into reaching agreement about what will be taught and how it will be evaluated, the resulting programme tends to be somewhat rigid and less responsive to individual student needs than is desirable.

During the programme's planning phase, some apprehension was voiced regarding the limitations of an ambulatory comprehensive primary care setting as the main location for medical student instruction. Among the reservations most often mentioned were: (*a*) the patients are not captive as they are in hospitals and will be less cooperative; (*b*) since health care in the USA is a private fee-for-service system, particularly for ambulatory visits, patients will not want medical students learning at their expense; and (*c*) the problems seen in ambulatory clinics are

routine and not sufficiently complex for educational purposes. Fortunately none of these predicted drawbacks has arisen. In fact, patients appreciate the extra attention and accept medical students as legitimate members of the health team. Some patient problems are indeed routine and simple. Nearly all, however, offer opportunities to learn the essentials of continuous care. Many other problems are most complex in nature and students have the opportunity to learn the proper management of undifferentiated symptoms at an early stage in their onset.

PERSONAL OBSERVATIONS

The origin of the Upper Peninsula medical education programme can be traced to a monograph published in mimeograph form in 1970 by Weston et al.[14] Initial interest of both the Federal Government and the state government simultaneously brought about a unique funding arrangement for a feasibility study. The state of Michigan provided funds for two years directly to the regional health planning agency. At the same time the Federal Government provided financial support for work at Michigan State University.

While the federal assistance required only a written report and a feasibility study, the intent was clearly to create a different form of medical education to be conducted in the Upper Peninsula. The innovation involved was of two kinds: a new form of regionally based, decentralized primary care education for physicians, and a comprehensive care delivery system designed for education and service. As is to be expected with a change of this magnitude, there were forces that tended both to increase and to limit the chances of success. The developmental strategy was to promote the positive forces and diminish the negative forces.

Several characteristics of Michigan State University and of the College of Human Medicine increased the potential for success. The College of Human Medicine has had a unique attitude concerning the relationship of the medical school to the state of Michigan, similar to that of the University's agricultural extension programmes. These programmes have developed decentralized mechanisms for bringing agricultural science to virtually all sections of Michigan. The College does not have a University hospital. The clinical education of medical students occurs within community hospitals which the medical school does not control.

The medical school has also been committed to innovative medical education and health care delivery. The dean of the school was sceptical during the early stages but was committed to seeing that the idea was given a chance to be put into practice. To be involved in experimentation

[14] WESTON, W. D. ET AL. *Community-based medical education—an integrated modular system of health care and education*, East Lansing, MI, Michigan State University, 1970 (mimeographed).

with change in medical education was not only tolerated by the College; it has been the essential ingredient of its mission and image.

Financial support from the state of Michigan and the Federal Government, specially designated for planning and developing the Upper Peninsula medical education programme, was very important to the programme's progress. Internal reallocation of operational funds was not possible. The product of the initial phase was not an operational programme but rather an assessment of whether such a programme was feasible. The funding plan, therefore, made provision for the necessary time to elapse during which relationships between the medical school and the region based upon mutual trust, respect and common commitment could be developed. Further, the plan permitted both the medical school and the region to have their own sources of financial support. Neither entity was totally dependent upon the other; at the same time cooperation was required in order for each to fulfil its obligations.

The geographic separation from the main campus of the medical school was both an advantage and a disadvantage. On the one hand, the distance necessitated alternative educational approaches. At the same time, the distance tended in the early phases to promote a separatism and isolation that was difficult for faculty members and students to accept.

Other factors militated against accomplishing the project's goal. A greater degree of flexibility in the curriculum of the College of Human Medicine was necessary before the programme could be implemented in the Upper Peninsula. The Upper Peninsula curriculum called for an instructional programme that integrated the learning of basic sciences around clinical cases. Evaluation of student performance was also to be integrated rather than discipline-based so as to be consistent with the integrated curriculum. It specified that small-group instruction was to be the predominant mode for learning; indeed, as a practical matter, conducting discipline-oriented lecture courses for ten students would have been too expensive.

In 1972, the curriculum was a lock-step one, departmentally based and lecture-oriented. The system for evaluating and certifying student performance rested with each department offering courses. Each department decided independently of other departments what would be taught, how it would be taught, and how students would be evaluated, a system common to most educational programmes.

Some modification of the curriculum was necessary, therefore, before medical education could be conducted according to plan for the Upper Peninsula programme. Federal financial assistance was used to foster the existing interest among the medical school faculty members in developing an alternative track for basic science instruction that was small-

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group format, integrated across disciplines and problem-oriented. Federal support was also provided for the development of a comprehensive system for evaluating student performance consistent with and complementary to the integrated curriculum.

There was some general opposition to the project for many reasons. One common philosophical objection was cited in a variety of ways: that high-quality medical education could not occur "that way"; that it had never been done before; that the concept was pre-Flexnerian; and that large hospitals were essential to the education of competent physicians. Other reasons for opposition among faculty members and department administrators (particularly clinical instructors) related to the potential drain on already scarce resources and the acknowledged difficulty of conducting medical education in five different communities as far as 95 kilometres away from the main University campus.

Within the Upper Peninsula, community leaders also had some concerns. There was little knowledge about medical education generally, and thus little or no interest in an experimental medical education programme. Some physicians who did know about the possibility of a pilot programme were opposed because they felt that it was a poor way to educate and that it would result in inbreeding, since the students would be selected from, educated and eventually practise within, the Upper Peninsula. Some of them felt that the establishment of an experimental medical education programme would be a more costly and less effective way of solving the problem of health care delivery than the establishment of a residency training programme. Upper Peninsula universities and colleges were cautious about a Michigan State University invasion because administrators felt that Michigan State University might encroach upon and compete with local education programmes for the health professions. There was some public concern that the region might perhaps be overstudied and that the outsiders might wish to solve Upper Peninsula problems by imposing some sort of solution and then withdrawing.

In the near future the programme will come under careful national scrutiny as part of the medical school's regularly scheduled accreditation review. It is evident that the programme has several unusual features and its quality and the competence of its graduates will need to be carefully assessed. In July 1977, the programme entered an expansion phase with financial assistance from the Kellogg Foundation to develop a family practice residency, expand the primary care delivery network, increase the relevance of the curriculum to the region, and explore training programmes for other professional health personnel.

The Upper Peninsula medical education programme involves significant changes in admissions policies, curriculum, and the setting of the educa-

tional process to explore the extent to which medical education can contribute to the solution of specialty and geographic maldistribution and improve health care in a region while maintaining educational quality. Although conclusive evidence of the programme's impact on health care in the Upper Peninsula will not be available for a few years, experience thus far is quite convincing that health education programmes can be so designed that health care for people is improved; that medical education can be conducted in a way that mitigates specialty and geographic maldistribution; that large universities and the people of regions can form working partnerships, neither partner dominating the other; and that good quality education for professional health workers can be achieved away from major academic centres.

CHAPTER 13

THE WAMI PROGRAMME, UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE, SEATTLE, WA, UNITED STATES OF AMERICA: DECENTRALIZING MEDICAL EDUCATION

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EDITORIAL NOTE

The high and rapidly rising cost of health care, variations in the quality of health care available, lack of definition of professional roles in the delivery of services, and a shortage of primary care physicians in rural and inner city areas are the health system's problems in the United States of America. The Washington, Alaska, Montana, and Idaho (WAMI) programme is a regional effort by a long-established medical school to increase the numbers of primary care physicians practising in rural areas.

When the programme began, the access of students from the states of Alaska, Montana and Idaho to places in medical schools was very limited.

WAMI is an example of a form of geographic decentralization of an educational programme. Parts of medical student instruction occur away from the main campus, using staff and facilities of colleges that do not have medical schools. Medical students study the first year of basic sciences in courses at regional colleges and universities. They return to the main campus in Seattle to take courses that are part of the regular medical school curriculum. After completion of basic clerkships in internal medicine, paediatrics, obstetrics and gynaecology, surgery, and occasionally psychiatry, students may elect to return for a six-week to six-month experience in the regional centres.

The WAMI programme was initiated and is being conducted by a medical school with a reputation for excellence in biomedical research. Certainly, many questions must have been raised as to whether the quality of the educational programme would suffer when part of the instruction took place away from the academic medical centre.

Satellite communications technology has been used on a pilot basis in the WAMI programme. Colour television images have been transmitted in two directions simultaneously in support of educational and health care delivery activities. Certain basic resources are required for good quality education—instructors, printed and non-printed reference materials, etc. Developments in communications technology, however, make it possible for students to be geographically separated by long distances from essential educational resources and yet still have them readily available.

Students receiving parts of their training away from the main campus do as well as those receiving their education solely at the main campus; the number of students admitted to medical school from WAMI states has significantly increased; more students are "anticipating" primary care as a field of practice; 16 out of 35 residents who have completed the WAMI programme are practising in towns with a population of less than 5000; and no money has been spent by WAMI states on capital expansion.

The importance to innovation of accreditation by national bodies, ongoing evaluation, the need for good communications, and maximum involvement by faculty members of the parent institution are emphasized.

The majority of the 210 million people in the United States of America are distributed along the eastern and western coasts. As a result, the central and the north-western parts of the country—the more rural areas—are only sparsely populated.

The health care system, which consumes between 7% and 8% of the gross national product, is in the main not a system at all. The two major exceptions to this generalization are the Veterans Administration Hospital System, which serves 1.4 million inpatients and 15.6 million outpatients per year through its 171 hospitals, and the Public Health Service, which operates nine hospitals and serves 400 000 people per year.

Outside these two systems independent professional health personnel deliver care and accept fees from patients, insurance companies and the Federal Government. The Government's involvement is primarily through the Medicare programme for the aged and the Medicaid programme for the poor and needy.

In general, physicians in solo or group practice provide health care on an ambulatory basis through offices or outpatient clinics. If hospitalization is required, the patient is placed in one of 5977 public hospitals or 1297 proprietary hospitals. Nurses are generally employed either by physicians to assist in offices and outpatient clinics or by hospitals to provide nursing services for patients in hospital. The two groups of health workers are assisted by members of some 26 different allied health professions, including pharmacists, medical technologists, radiation therapists, pulmonary therapists, and physical and occupational therapists.

RECENT DEVELOPMENTS AFFECTING MEDICAL EDUCATION

In 1974, the United States Congress passed the National Health Planning Resources Development Act. By virtue of this Act a national health planning council and a series of 205 regional health planning councils were established. These councils regulate the construction of health care facilities, the use of resources and the delivery of services.

In addition to the Planning Act, a recent Federal statute has required the establishment of professional standards review organizations aimed at assuring the delivery of the highest quality of health care. This is accomplished, in the main, through retrospective assessments of the quality of care delivered by an audit of patient records. Such audits are required if hospitals are to be accredited, which, in turn, is required for Medicare and Medicaid payments.

Another recent development has been the concept of a team of professional health personnel working together to deliver care. Such teams include physicians, nurses, members of allied health professions, and clinical pharmacologists. Concomitant with this development has been the emergence of physicians' assistants. One example of the new middle level health worker is the "medex", a category composed of ex-military corps-men who receive practical and didactic training before they join the team to work under the supervision of a practising physician. In addition, various programmes to train nurses for expanded health care roles have developed across the USA. Some nurse practitioners function independently as providers of primary care and charge patients on a fee-for-service basis. Others function essentially as physicians' assistants.

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MANPOWER AND EDUCATION

The manpower for the health system is produced by 120 medical schools, of which 85 are private and 35 are state supported. These schools currently produce over 13 600 physicians per year. In addition, there are 58 dental schools, 73 pharmacy schools, 1359 nursing schools and numerous allied health training programmes. Some of these allied health programmes are affiliated with universities while others are operated by community colleges or independent organizations.

Recent innovations in medical education include an increased emphasis on the training of primary care physicians, the establishment of blocks of elective time during which students select courses for study and the establishment of independent study programmes which may use computers for instruction or evaluation.

HEALTH SECTOR PROBLEMS

It is not surprising that a health care system as large and diverse as that in the USA has certain problems. These include:

(*a*) The expensive duplication of facilities, equipment and services in virtually every population centre; to date, efforts to avoid this through health planning have not, in general, been successful;

(*b*) The variation in the quality of health care being provided; in large part, this reflects a failure to define standards of care which can be monitored and which are acceptable to the professional health worker;

(*c*) Because of the need perceived in the 1960s for increased manpower, large numbers of new health care practitioners have been or are being produced; since all of these are designed to provide primary care, there is an overlapping of roles and functions, and, as a consequence, the need for a definition of roles in the delivery of services is acute;

(*d*) The serious specialty and geographic maldistribution of physicians, which has resulted in an excess of physicians in relatively affluent population centres and few primary care physicians for rural or inner-city settings; and

(*e*) The alarming increase in the costs of health care over the past five years; if this trend continues, 12% of the gross national product will be utilized for health services by the mid-1980s; containment of health care costs has become of enormous importance.

THE UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE

The University of Washington School of Medicine (UWSM) was established by the state of Washington in 1946 to provide access to

medical education for, and to improve the health care of, the residents of that state. At present, it is one of six schools that comprise an academic health science centre. The others include Schools of Public Health, Dentistry, Nursing, Social Work, and Pharmacy. Administratively, the deans of these health schools report, as a Board of the Health Sciences, to a Vice President for Health Affairs. This Vice President is responsible for operating the Health Sciences Center and the University Hospital and Harborview Medical Center, which have 245 and 301 beds respectively. These two hospitals together admit 16 989 patients and provide 300 000 outpatient visits per year.

In the quarter of a century since the School of Medicine was established, it has developed a reputation for excellence in biomedical sciences and, at present, commands a larger amount of Federal support for basic scientific research than any other medical school in the USA. An expression of this excellence may be found in the centres devoted to the study of specific areas of biology and medicine. Included among these are the Cardiovascular Center, the Primate Center and the Center for Child Development and Mental Retardation. In all, there are 16 biomedical science centres in the health science complex.

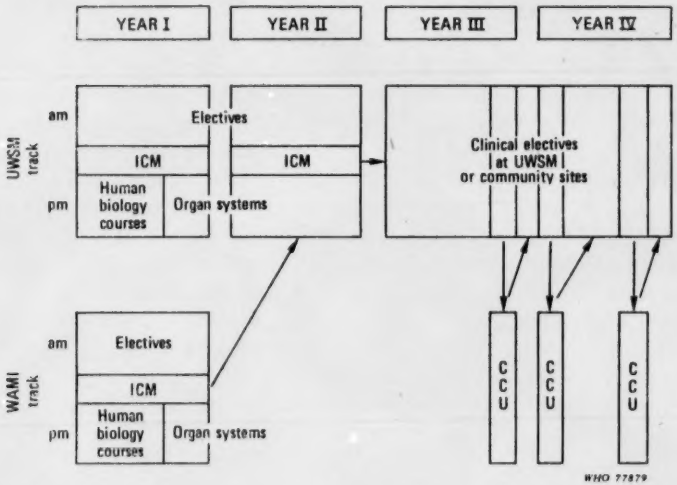
In addition to the scientific excellence of the institution, the School of Medicine is looked to as a tertiary care referral centre serving the states of Washington, Alaska, Montana, and Idaho (WAMI) and a portion of Oregon. In order to accomplish its care and its educational functions, the School of Medicine is primarily responsible for patient care in the two hospitals operated by the Health Sciences Center and has developed major affiliations with five additional hospitals, including the Veterans Administration Hospital, the Public Health Service Hospital and the Children's Orthopedic Hospital. In addition, a number of minor affiliations have been developed with 25 more hospitals throughout the four WAMI states. In the University Hospital and Harborview Medical Center, a variety of clinical centres have been established to promote excellence and research in health care. Included are a Burn Center, a Neonatology Center, a Transplant Center and a Cancer Therapy Center. In all, the School has access to over 2000 beds for teaching, research and patient care.

Educationally, the School of Medicine is responsible for the continuum of medical education, including undergraduate medical education, graduate medical education (also referred to as residency or house staff training) and continuing medical education. In addition, the staff of the School of Medicine are responsible for postgraduate education leading to the Doctor of Philosophy degree, postdoctoral studies, and the education of visiting scientists. A variety of service courses are also offered for other health schools as well as for undergraduate students from the

University of Washington. Finally, the School has a number of allied health training programmes, including physical and occupational therapy and medical technology. In all, the 626 faculty members of UWSM deliver educational experiences to over 12 000 students per year including the 600 undergraduate medical students, 500 house staff and 5000 practising professional health personnel.

At the undergraduate medical education level, a new curriculum was instituted in 1968 which stressed flexibility, integrated systems teaching involving the basic and clinical sciences, an elective programme to allow students to specialize earlier in their careers, and a family medicine stream (Fig. 1). This stream was designed to attract more students into primary care; in common with the remainder of the curriculum, it espoused the concept that time should be the variable and achievement the constant in undergraduate medical education.

FIG. 1. A COMPARISON OF THE WAMI CURRICULAR TRACK AND THE "TRADITIONAL" UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE (UWSM) TRACK



Note that not all students who take the first year at a WAMI university participate in the community clinical units (CCU). Conversely, students starting in Seattle may choose a number of community experiences. (ICM = introduction to clinical medicine.)

In 1972, an experimental independent study programme, modelled after the Ohio State University Program, was initiated. The independent study programme, which covers the first two years of the undergraduate curriculum, allows students to proceed through 35 modules of study at

variable rates, following which they are examined against competency-based objectives.

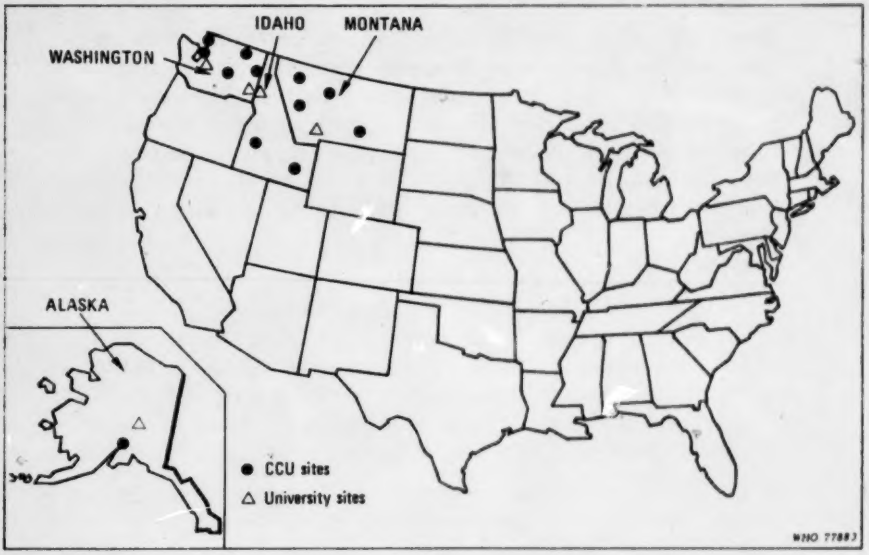
UWSM's annual operating budget is approximately US $ 50 million. Of this, about 25% derives from state sources, 70% from the Federal Government and 5% from private sources. Compared to other medical schools, it is well financed.

The chief executive officer of the School is the dean, who is supported by three major associate deans. These associate deans are responsible for the academic, scientific, and clinical affairs of the School. The associate deans are in turn supported by a number of assistant deans, including those responsible for admissions, curriculum, and student affairs.

THE WAMI PROGRAMME

The acronym WAMI is formed from the initial letters of Washington, Alaska, Montana, and Idaho (Fig. 2). These four states collectively represent 22% of the land mass of the USA and have cities separated by distances exceeding the distance between Los Angeles and New York

FIG. 2. THE WAMI STATES (WASHINGTON, ALASKA, MONTANA, AND IDAHO) AND LOCATIONS OF THE WAMI PROGRAMME TRAINING SITES



City. Since the WAMI territory stretches across five time zones and has only slightly over six million people within its boundaries, it is immediately apparent that it is a predominately rural area. It has a variety of problems relating to health education and health care delivery; among these problems are the following:

Access to medical education. At present, the number of qualified candidates applying for admission to the medical departments of the WAMI states is greater than the number of places available. The states of Alaska, Montana, and Idaho have no medical schools, and residents of these states apply for admission to UWSM. This situation is complicated by the fact that the entering class could be filled three times over with qualified Washington residents without considering students from the other states.

Limited capital construction funds. The question must be raised why there are no medical schools in the states of Alaska, Montana and Idaho. The answer is readily apparent when the tax-derived operating budget of Montana or Idaho of around US $ 200 million is compared with the cost of constructing a new medical school (between US $ 50 million and US $ 100 million). It is not economically feasible for these states to support separate medical schools. They must therefore depend on medical schools supported from other sources for the education of their residents.

Shortage of primary care physicians. In the four WAMI states, there is a shortage of primary care physicians. By definition, these are the physicians who provide first contact, comprehensive and longitudinal care for families. Social and behavioural problems are an integral part of these practices and a major emphasis is placed on preventive medicine. Among the disciplines which qualify as primary care disciplines are family medicine, internal medicine, paediatrics, and obstetrics and gynaecology.

Geographic maldistribution of physicians. Coupled with the shortage of primary care physicians, there has been a severe geographic maldistribution of physicians in the Pacific North-West and Alaska. The result is a very severe shortage of primary care physicians in the rural areas of the WAMI states. While there are differences of opinion as to how severe this shortage actually is, there is a general consensus that steps should be taken to correct the situation.

Regionalization of medical centre resources. While a number of secondary and, in some cases, tertiary care centres exist in the WAMI territory, certain health care and educational resources are to be found only in

the medical centre at UWSM. Among these are the clinical centres referred to earlier and a major health sciences learning resources centre. It is not surprising, therefore, that the majority of these resources are used by the local community in Seattle and have only to a limited extent been made available to the surrounding region.

PROGRAMME DESCRIPTION

Assumptions

The WAMI programme of decentralized medical education was developed as a response to the problems outlined above. The programme was designed to test *inter alia* the following five assumptions:

Admissions. If physicians are to be placed in rural areas, a greater number of students must be admitted with rural backgrounds. This follows, since a greater number of physicians practising in rural areas have rural backgrounds than do physicians practising in urban settings.

Undergraduate medical education—Year I. During the initial exposure to the basic sciences, students must be provided with the opportunity to observe primary care role models in rural areas. While this exposure will be more "romantic" than educational, it will make an impression on students at a time when they are beginning to undergo the socialization process of medicine. This process involves the exposure of the future physician to the mores, mystique and gestalt of medicine. As such, exposure at this time in a physician's life is the first step towards recruitment for rural practice.

Undergraduate medical education—Years III and IV. By the time students have received their basic science instruction and are receiving their initial clinical instruction, it is desirable to expose them to primary care role models in communities which have unmet health care needs. These experiences must be highly structured, well coordinated and extensively integrated with the overall curriculum. They must also be reviewed and continuously evaluated. Such exposure will reinforce the rural background and the early "preceptorship experience" of the first year and will result in a heightened enthusiasm for rural practice.

Graduate medical education—residency training. Once students have received their medical degrees and have entered house staff training, it is desirable to provide them with a third exposure to primary care role models in rural settings and, in so doing, continue the process of recruitment. At this phase of their training, the residents or house staff will be

in a position to participate as full members of the health care team and will be able to understand and appreciate the challenges and rewards of practice in rural areas.

Maintenance of practising physicians. If the socialization pressures outlined in the above four steps have been successful and if the assumptions are correct, at least some of the graduates will establish practices in rural areas. It is clear, however, that if such practitioners are to be retained in rural areas, it will be necessary to provide not only consultative services and opportunities for continuing medical education but also time for personal growth and recreation. In the area of professional growth, continuing medical education opportunities must be available in the local communities as well as at regional centres. Hence, a system of maintaining physicians in the rural areas must be developed if the profits from the investments made in the admission process, in undergraduate medical education and in graduate medical education programmes are to be maximized.

University phase

The WAMI programme of decentralized medical education consists of two phases: the university phase and the community phase. In the university phase of the programme, students are admitted to UWSM from all four participating states. A portion of the entering class is assigned to receive the first year of instruction at one of four universities which do not have medical schools. Included among these are the University of Alaska in Fairbanks, Alaska; Washington State University in Pullman, Washington; the University of Idaho in Moscow, Idaho; and Montana State University in Bozeman, Montana (see Fig. 2). In the 1975/1976 academic year, 72 of the 175 students in the entering class participated in the WAMI programme. Students from Alaska, Montana, and Idaho are expected to attend the university in their own state, while Washington residents are allowed to express a preference of sites. These preferences are followed as far as possible in assigning the students.

The faculty members for the medical programmes are drawn in part from staff at the individual institutions and in part from elsewhere in the USA. The selection of staff and their assignments to the teaching committees are reviewed and approved by the academic affairs committees and by the appropriate departments in UWSM.

The curriculum (see Fig. 1) is planned by a region-wide committee containing representatives from each of the universities and is chaired by a faculty member from UWSM. Planning includes the goals and objectives for the individual courses, the essential or required content for jthese courses, course outlines, learning resources, and common evaluation

systems for the courses. In short, the goal of the WAMI programme is to present a "common" course at five locations in the WAMI territory and not to present five separate courses. These "regional" offerings are reviewed by the academic committees at UWSM, where the ultimate responsibility for their quality and for conducting them lies.

Student performance is evaluated by the Student Progress Committee of UWSM. Decisions regarding remedial actions, special petitions and distinctive achievements are made by this Committee after the receipt of suggestions from faculty members, course committees and university phase coordinators of the programme.

Administratively, each participating university employs a full-time WAMI coordinator. These coordinators report directly to the associate dean for academic affairs at UWSM and possess the title of assistant dean in UWSM. A job description for these coordinators has been developed and the appointment termination of contract of a coordinator is made jointly by the university involved and the School of Medicine. To date, 191 students have participated in this phase of the WAMI programme.

Once the students have completed the first year of training at peripheral sites, they return to Seattle, where they join their colleagues who matriculated during their first year at the Seattle campus. The students then embark upon the second three quarters of their education, which involves exposure to the systems courses taught by interdisciplinary teams of faculty members. During this portion of the curriculum, approximately 50% of the students' time is available for electives in basic or clinical sciences.

Towards the end of the second year of the curriculum, students are required to select one of four "pathways" for the last six quarters of study. Included among these pathways are: the clinical specialist pathway, the behavioural specialist pathway, the medical scientist pathway, and the family medicine pathway. Experience to date reveals that 40-45% of the students each chose the clinical specialist and family medicine pathways and the remaining 10-20% of the class distributed itself evenly between the medical scientist and behavioural pathways. Once a pathway is selected, the student, in conjunction with his adviser, outlines a curricular plan for the six quarters, using the pathway guidelines as a model.

Upon successful completion of the basic clerkship experiences in internal medicine, paediatrics, obstetrics and gynaecology, surgery, and occasionally psychiatry, students may select a six-week to six-month experience in the community phase of the WAMI programme. In some cases, such as paediatrics, obstetrics and psychiatry, the community experiences may represent the only exposure that students have to these disciplines during their undergraduate training programmes.

THE WAMI PROGRAMME

Community phase

The community phase of the WAMI programme is primarily composed of office-based clerkships with hospital privileges experience in communities throughout the WAMI territory. It is designed to provide the student with exposure to primary care role models in an area similar to that which has a health manpower need. As such, the community phase has three general goals:

(*a*) The health care goals focus on the confined expansion of the students' ability to diagnose and treat both acute and chronic illnesses on an ambulatory and inpatient basis;

(*b*) The community goals centre on familiarization of the student with the structure and function of the community, the multiple roles that a physician must play to be a part of that community, the health problems which exist in the community and the resources that are available to meet these problems; and

(*c*) The practice management goals are designed to familiarize the student with the basic essentials required to establish a group practice, including personnel policies, book-keeping, records, facilities, and insurance.

In addition to the students, residents from the discipline in which the community clinical unit is established are assigned to the community clinical units for periods of six weeks to six months. The goals for the residents are essentially the same as those for the students, although a more advanced understanding is expected. Residents are also expected to participate as full members of the health care team and be helpful in providing instruction and supervision for the students. Spouses of both students and residents are encouraged to go to the units so that they may also be immersed in the atmosphere of the community and the roles that they will have to assume if their spouse establishes a practice in such a location.

In an attempt to maintain communication between the School of Medicine and the community, faculty visits are made to the communities every six weeks. While there, the faculty members review the progress of the students and the residents, discuss the administration of the programme with the community-based staff, act as educational or health care consultants for the physicians in the community and serve as a focus for continuing medical education. Reciprocally, once every quarter, the peripheral staff are encouraged to come to Seattle for an administrative review of the programme, personal efforts in continuing medical

education, and general education relating to the integration of the community clerkships with the ongoing academic programme at UWSM.

Formal contracts are written between the School of Medicine and the practising physicians who hold faculty rank at UWSM. Included in the contracts are such items as salary, support for living quarters and travel, and financial assistance for office personnel. In addition, the School of Medicine establishes small libraries and learning resources in each of the community clinical units.

Administratively, each of the community clinical units elects one of its faculty members to serve as a coordinator. This coordinator in turn establishes contact with the departmental coordinator in the discipline in which the unit is established. The departmental coordinator is a full-time faculty member of the relevant department at UWSM and has the responsibility of operating the community clinical unit. Included in this responsibility is the requirement for evaluation, assignment of students, faculty visits, and end-of-quarter meetings. Departmental coordinators report jointly to their respective departmental chairmen as well as to the associate dean for academic affairs, who serves as the director of the WAMI programme.

At present, fifteen community clinical units are operating in the WAMI territory. They include units in: family medicine (Anacortes, Washington; Grandview, Washington; Omak, Washington; Pocatello, Idaho; Spokane, Washington; Whidbey Island, Washington; and Whitefish/Kalispell, Montana); internal medicine (Billings, Montana; Missoula, Montana; and Wenatchee, Washington); paediatrics (Great Falls, Montana; Pocatello, Idaho; and Spokane, Washington); obstetrics and gynaecology (Boise, Idaho); and psychiatry (Anchorage, Alaska).

In the five years since the WAMI programme began, 449 students and 112 residents have been trained in the community phase.

EVALUATION

In general, the evaluation plan for the WAMI programme has two major thrusts. The first is to ascertain whether the goals of the programme are being achieved. The second is to determine whether the education is of an acceptable quality. It was recognized from the beginning that the quality of education would undoubtedly vary from year to year, from institution to institution, and from community to community. Hence, constant monitoring would be necessary if the disparate parts of the programme were to remain a cohesive part of the whole and if superior quality educational experiences were to be continuously pre sented in remote areas.

While the evaluation of the WAMI programme is ultimately concerned with the accomplishment of the major goals of the programme the primary activities so far have been in assessing: first, the quality of the educational experience afforded to students participating at sites other than the University of Washington Medical Center in Seattle; secondly, the attitudes of faculty members and students involved in the programme; and thirdly, the impact of the WAMI programme on the career choices and practice style of UWSM graduates.

The quality of the educational experience in the university phase is assessed by comparing students' performance in common tests in each of ten courses in the first year, in a comprehensive examination of the first-year curriculum, in subsequent course work in the second year, and in National Board examinations. First-year evaluations by the students provide valuable information on the courses and on the effectiveness of the decentralized curriculum. Student and staff attitudes towards the programme are monitored at regular intervals, as are the career aspirations of students.

Evaluation of the community phase of the programme extends to student performance in clerkships as related to specific objectives for each clerkship; to the documentation of student learning experiences by means of daily logs maintained by students and by interviews and questionnaires; to staff and course evaluation by students and residents; and to student and staff attitudes toward the programme.

An effort is being made to measure the impact of the programme on physicians' practices by means of prospective and retrospective daily work sampling sheets. Career choices of students are also carefully monitored in the clinical phase and continuing medical education for physicians in the WAMI territory is evaluated in terms of opportunity, participation and subject matter.

Achievement of programme goals

The first goal was to increase the number of students admitted to medical school from the WAMI states. The following figures, showing the percentage increase in the number of medical students, indicate that this goal is being achieved:

	Total number		*Average number per year*		
State	*Before WAMI programme 1966-1970*	*Since WAMI programme 1971-1975*	*Before WAMI programme*	*Since WAMI programme*	*Percentage increase*
Washington	360	516	72.0	103.2	43
Alaska	3	30	0.6	6.0	900
Montana	7	42	1.4	8.4	500
Idaho	9	47	1.8	9.4	422

The second goal was to increase the number of primary care physicians being trained. The results are as follows:

Choice of family medicine stream by students at UWSM

	Year of entrance	*Number in family medicine stream*	*Total number in UWSM*
Before WAMI programme	1968 1969 1970	88	269
Since WAMI programme	1971 1972 1973	147	361

It is apparent that a larger number of students are being attracted into the primary care discipline of family medicine than formerly. If an additional 25-35 students per year who have chosen the clinical specialist stream but who express a preference for a primary care outlet in either internal medicine, paediatrics, or obstetrics and gynaecology are added to these figures, it is clear that increasingly larger numbers of students are anticipating primary care as their professional domain.

The third goal was to bring the resources of the Medical Center at UWSM to the communities in the WAMI territory lacking these resources. The following resources of UWSM were made available to communities (1974-1975):

28 UWSM faculty members presented 41 programmes at WAMI community clinical units attended by:

368 Community clinical unit instructors
464 Other community physicians
607 Health service personnel

Circuit courses in 17 communities attended by:

5 UWSM Faculty members

319 Physicians
640 Paramedical personnel (nurses, middle-level health personnel, and members of various allied health professions, including medical technologists, radiology technicians and physical/occupational therapists).

It is apparent that by creating a flow of faculty members between the medical centre and the communities, a large number of professional health workers are being exposed to continuing education that otherwise would not occur. In addition, the School of Medicine is receiving in its

various specialty treatment centres, a progressively larger number of requests for consultation or direct patient care. This, together with a telephone consultative service (Medcom), operating 24 hours a day seven days a week, offered by the School of Medicine, clearly indicates that the resources of the medical centre are being used by the practitioners in the surrounding four states.

The fourth goal was to redress the geographic maldistribution of physicians. The following figures show the practice locations of WAMI programme participants, at July 1975:

Type of practice	*Number of physicians*	*Percentage of physicians*
Rural—small	16	45.7
Rural—medium	5	14.3
Military	5	14.3
Fellows	3	8.6
Urban	3	8.6
Faculty	2	5.7
Inner city	1	2.8
	35	100.0

It is apparent that the great majority of residents who have completed this programme are practising in small towns (less than 5000 inhabitants) or medium-size towns (5000-15 000 inhabitants). By usual definitions, such practices would be considered to be rural and thus these preliminary data are encouraging. It should be pointed out, however, that the number of participants who have completed training and are now in practice is relatively small and no firm conclusion can therefore be drawn relative to the effectiveness of the WAMI programme in redressing distribution.

The fifth objective was to accomplish programme goals without "bricks and mortar". The capital expenditures for the WAMI programme have been nil. While some minimal remodelling has been done, including changing configuration of rooms, location of doors, etc., no capital construction has been performed. Considering that the class size at UWSM has been increased by nearly 75%, it may be concluded that the fifth goal is being met.

Quality of education

The second general area of concern related to whether the quality of education being offered at sites peripheral to UWSM was satisfactory. No differences have been detected in the university phase on common examinations, internal year-end comprehensive examinations, performance in courses which are taken together after the university phase and

external evaluations such as National Boards examinations, Parts I, II and III. It seems evident that the quality of education is being maintained in the university phase.

Relative to the community phase, similar evaluations (including performance in National Boards examinations, performance in comprehensive examinations) have indicated no difference between students who participated in the WAMI programme and those who did not.

Finally, UWSM and its WAMI programme underwent an accreditation review by the Liaison Committee on Undergraduate Medical Education in 1975. This Committee, whose membership is drawn from the American Medical Association and the Association of American Medical Colleges, is responsible for the accreditation of all medical education programmes in the USA. As a result of a ten-day, nine-man review of the WAMI programme and undergraduate medical education at UWSM, the Committee recommended to the Coordinating Council of Medical Education (the parent body of the Liaison Committee) that the entire programme be accredited for seven years. Since this represents the maximum length of approval which can be given, it appears that the question of the quality of education has been answered to the satisfaction of an external review group.

Administration

The WAMI programme is administered under the auspices of the office of the associate dean for academic affairs. This associate dean is responsible for admissions, student progress, the medical school curriculum, the Office of Research in Medical Education, and continuing medical education. To facilitate the administration of these areas, standing committees exist for admissions, student progress, curriculum, and continuing medical education. It follows, therefore, that the portion of the university and community phases that relates to any of the existing standing committees is reviewed by that committee prior to the time of implementation. For example, the curricula of both the university and community phases are reviewed and approved not only by the curriculum committees but also by their parent committees, the academic affairs committees. In general, the administration of the programme is so designed that the academic affairs committees of UWSM have ultimate responsibility for quality control.

Cost

At the request of the University of Washington, a cost study of the WAMI programme was undertaken in 1974 by the management consultant firm of Kasonic, Chapelle and Associates, Inc. The purpose of the study was to define the costs of educating medical students in the WAMI

programme as compared to educating students in the traditional way in Seattle. In this study, only the net educational expenditures (salaries, supplies, services and indirect costs) were included. The maintenance of clinical and basic science skills and initial capital investment costs were excluded. In 1975/1976, the net educational expenditures for the education of a medical student in the WAMI programme was US $ 70 700 as compared to US $ 51 600 in the traditional programme. The increased costs reflected travel expenses, housing costs, increased administrative requirements and some experimental start-up costs which are expected to diminish with time and experience. These increased costs should, however, be compared with the total costs, including capital expenditures (estimated to be US $ 25-150 million for an entering class size of 40 students), of establishing four new medical schools (one each in the four states involved in the WAMI programme). Such a comparison has convinced the individual states that the WAMI programme is a cost-effective way of buying medical education for residents of their states.

Implementation

The WAMI programme was implemented according to the following steps:

(*a*) The original design and boundary conditions of the experiment were reviewed by a WAMI advisory committee and other academic affairs committees of the School of Medicine. Subsequently, it received the approval of the administration of the School of Medicine as well as the administration of the University. Simultaneously, the university phase of the WAMI programme was reviewed and approved by the appropriate committees in each of the participating universities.

(*b*) Approval and support for the WAMI undertaking was then sought from the governing boards of education in the states involved, as well as the medical societies of these states. Included among these boards were boards of trustees, boards of regents and boards of higher education.

(*c*) With the concurrence of the universities involved, the professional organizations and the boards responsible for the educational programmes in the individual states, the legislatures and the governors of the WAMI states were approached in connexion with appropriations and enabling legislation. This particular step was conducted only after the programme had been in existence for four years and during which time financial support had been provided by the Commonwealth Fund of New York City, a private philanthropic foundation, and by the Bureau of Health Resources Development of the Health Resources Administration (a division of the Department of Health, Education, and Welfare). This was consistent with the general philosophy that the experiment should

be tried with non-state funds. If the programme were to prove educationally sound, economically feasible and logistically possible, it was expected that the individual state governments would then assume financial responsibility. In order to allow the establishment of a programme which crossed state boundaries and to charge "resident fees" to students from Alaska, Montana, and Idaho, it was necessary for the legislature of the state of Washington to pass an enabling statute.

(*d*) Contracts were developed between the University of Washington Board of Regents and the boards of the individual states. Included in this agreement were sections relating to the number of students who would be admitted to the programme, the student evaluation plan, the general conditions of the programme, budgetary commitments and procedures for termination of the agreement by either party.

PERSONAL OBSERVATIONS

On the basis of five years' experience with an experimental, decentralized medical education programme, a variety of conclusions have been drawn. Included among these are the following.

It is absolutely essential that a home base be established to make such a programme operate effectively. This home base must have high-quality teaching staff representative of a wide variety of disciplines, a cohesive administrative structure, and significant educational resources including a major library, a learning resource centre and an office in which expertise exists to evaluate the experimental programmes.

Repeated and frequent meetings are necessary between the administrators and staff of the programme if it is to maintain a cohesiveness and a sense of uniformity of purpose and direction. Any departure from this will inevitably result in fissures, separation and fragmentation. All of these are detrimental and, if allowed to proceed unchecked, will result in the ultimate destruction of the programme.

Extensive ongoing evaluation is necessary to determine whether continuing quality standards are being met and whether the programme goals are being achieved. This evaluation must extend for at least 20-30 years and should include an assessment of where students practise, how long they maintain that practice location and what turnover there is in the specialty discipline and type of practice which they are involved in.

Students and residents are enthusiastic about both phases of the WAMI programme. These decentralized efforts, when coupled with the educational experiences which are offered at the medical centre in Seattle represent the best of the pre- and post-Flexnerian era of medical education in the USA. In the opinion of the programme staff, it is a combination

of the two which will produce the kind of professional health personnel best equipped to meet the health needs of society.

Less than 5% of the practising physicians in any given discipline are willing and able to be a formal part of such a programme. This in large part reflects not so much the lack of desire on the part of the practitioners, but rather the extensive investment of time that a practising professional worker must make if he or she is to be involved.

Among the ongoing and continuing needs of the programme, the requirement for communication between the parties involved is of paramount importance. Regardless of the efforts which go into meeting this requirement, there seem to remain continuing needs. This is not surprising considering that the programme deals with faculty members spread over one-quarter of the land mass of the USA and separated by distances exceeding 8000 kilometres.

Any educational innovation with as far-reaching implications as the WAMI programme unavoidably stimulates anxiety, animosity and counterreactions. Even an institution which is dedicated to experimentation has such reactions. Because of this, maximum faculty participation in the form of committees, *ad hoc* advisory groups and direct involvement is essential. As evidence of the success of this approach, a general faculty vote was held on the WAMI programme relative to its continuation after three years of experimental programming. By a margin of 10 to 1, expansion of the programme was approved. Among the concerns expressed by faculty administrators, regents and legislators were the following:

(*a*) *Quality of educational programmes.* The primary concern of any respectable faculty member is the quality of the educational programme provided for the students. Faculty members know the value of maintaining control of the educational experiences through the appointment of staff, planning and presenting the curriculum, selecting the students and evaluating the outcomes. In so doing, they control the environment in which education occurs. A decentralized education programme such as the WAMI programme challenges the very essence of this "academic philosophy". Hence, an inordinate amount of energy and resources must be utilized in the evaluation of the programme. Ideally, faculty members should be involved in establishing the evaluation plan.

(*b*) *Cooperation.* The problem reflected in this view is that "universities and states are like separate kingdoms of thievery" and, as such, they will never share the responsibility for an education programme. The success of the WAMI experiment belies the basis for this point of view. If the incentives are sufficiently great, cooperation can be achieved. The challenge of the WAMI programme was to create the incentives.

(*c*) *Accreditation.* To be accredited by the Liaison Committee on Medical Education—a joint body composed of members of the American Medical Association and the Association of American Medical Colleges—all medical schools in the USA must conform to the standards laid down by that body. Since the WAMI programme represents a departure from traditional styles of medical education, many medical educators at the University of Washington and elsewhere predicted that it would never pass a stringent review and evaluation. By following the guidelines for accreditation and by employing medical education experts as consultants, the programme was successful in receiving a full, seven-year accreditation approval after one of the most exhaustive reviews in the history of United States medical education.

(*d*) *Financial considerations.* Since medical education is so expensive and since the WAMI programme requires four states to appropriate funds to support it, reservations were expressed about the funding stability of the undertaking. To date, all four states have appropriated the requested funds. In large part, this reflects the fact that the programme is designed to meet problems that members of the legislature can understand and identify with.

(*e*) *Role of faculty members.* Concern about the role of faculty members was most convincingly expressed as: "We weren't consulted and now the programme is a *fait accompli*". This problem must be anticipated and the appropriate faculty committees established for review and comment. A special advisory committee worked very well for the WAMI programme.

Because of the geographic and time barriers which a programme of this nature confronts, a reliable and responsible communications system is highly desirable. While telephone communication plays a part in fulfilling this requirement, it is not the ultimate answer. The School of Medicine has been interested in the use of experimental communications satellites for the transmission of video and audio information in two directions simultaneously. The first experience the School has had with this mode of communication involved NASA's ATS-6 satellite, which transmitted colour television images in two directions simultaneously. After one year of experimentation with this satellite, there is general agreement that satellite telecommunications have broad applicability to those areas which have time, geographic, or distance barriers. This is especially true of education and health care delivery, which require video signals for a portion of the task to be performed.

After five years of experience with the WAMI programme, a general consensus has emerged which supports this concept for medical education In addition, it is apparent that the decentralized education concept has

applicability to other health disciplines or regions with similar geographic, financial, educational and health care challenges. There must, however, be a communications and transport system available which will allow for integration and programme coordination if these efforts are to be successful.

It is also necessary to develop a region-wide plan for graduate medical education and continuing medical education, if the goals of the WAMI programme are to be fully realized. Extensive efforts to provide a certain type of undergraduate medical education may be effectively nullified if, for example, too little postgraduate training is available to continue this orientation. Graduates who have to choose training in disciplines and in sites which are not to their liking may jeopardize their future professional development.

It is equally apparent, however, that if an effort is made to embark on a programme of this nature, a dedicated commitment must be made on the part of the major administrators involved. This is required in order to develop cohesive adherence to a single goal, to achieve cooperation between dissimilar universities and to provide uniform programme activity across state boundaries.

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CHAPTER 14

ECOLE INTER-ETATS D'INGENIEURS D'EQUIPEMENT RURAL, OUAGADOUGOU, UPPER VOLTA:

TRAINING PUBLIC HEALTH ENGINEERS FOR RURAL SERVICE

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EDITORIAL NOTE

The Ecole inter-Etats des Ingénieurs de l'Equipement rural (EIER) provides a regional intercountry training programme for rural engineers; its first group of students was admitted in 1970. It is administratively managed by a board made up of representatives from 13 African States. The case study is a prime example of technical cooperation between developing countries, reflecting the judgement that engineers with skills particularly needed by rural communities of the region could be trained collectively at a lower cost than if each country were to establish its own training programme. These advantages of rural technical cooperation outweighed concerns that the climatic differences among the countries called for programmes tailored to each area.

The primary purposes of EIER are to train engineers for rural areas, provide continuing education, conduct applied research and provide technical cooperation when requested. The School's orientation is towards the practical and readily useful as opposed to the theoretical and sophisticated. It seeks to provide its graduates with the knowledge and skills most needed by the region.

Constant tension is created in the definition of curricular content between practical knowledge and recent advances, for some combination of both is essential. The cultural, community and human dimensions of an engineer's job are also important, since technology must be adopted by the people if it is to be of value.

There is concern that the programme may attempt to cover too many areas generally rather than a few areas in depth. Also troublesome is the fact that some of the students tend not to want to live in the villages in which they are most needed and whose problems they are trained to deal with. They seem to seek status and a comfortable life style; it appears to be necessary to change these attitudes.

In June 1966, during a meeting of the ministers of the Common Afro-Mauritian Organisation (Organisation commune africaine et mauricienne—OCAM) at Tananarive, the delegation of Upper Volta presented a report on the advisability of creating, in Africa, a regional school for engineers specializing in sciences and techniques applicable to the development of the rural environment. The report was acted upon and the Ecole inter-Etats des Ingénieurs de l'Equipement rural (EIER) was created in Ouagadougou. The Republic of Upper Volta donated the land on which the School stands, and the buildings were financed by the French Fonds d'Aide et de Coopération.

Why a regional institution rather than national schools? The present need for rural engineers cannot justify the establishment of national schools in each country. The creation of a regional institution meets this need while reducing, for each country, the cost of training engineers. Previously, this category of personnel had to be trained abroad, most often in other continents with very different ecological conditions and where an engineer's functions do not necessarily correspond to those needed in Africa.

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These advantages outweigh the objection that can be made to this type of institution on the ground that the distances separating it from its member countries entail a heavy administrative load.

It can also be argued that Africa has various climatic conditions and hence that the problem of teaching in the natural environment is not solved by EIER. An answer is that the similarities between these countries are greater than their differences. They all have a hot climate and a homogeneous human environment, as well as common cultural, historical and economic features.

ECOLE INTER-ETATS D'INGENIEURS D'EQUIPEMENT RURAL

EIER is an entirely autonomous regional institution. It is placed under the authority of an administrative board made up of representatives from the following 13 African countries: Benin, Central African Empire, Chad, Congo, Gabon, Ivory Coast, Mali, Mauritania, Niger, Senegal, Togo, United Republic of Cameroon, and Upper Volta). At present, the operational cost is shared half by the member countries and half by France. The director carries out the aims and policy defined by the administrative board and submits to the board the accounts and balance sheet of the past year as well as an estimated budget for the following year.

The School received its first contingent of students in January 1970. Student enrolment has now reached its maximum of 25 per year. There are ten permanent faculty members, assisted by 20 free-lance and four missionary teachers.

Functions

The role of EIER is to train engineers who will be able to promote and implement development techniques that will improve the rural environment and raise the standard of living. It must also, if so required, organize training periods, continuing education classes, and refresher courses for agricultural engineers anxious to update and extend their knowledge.

The School's laboratories are used for teaching purposes and for conducting research in various fields. EIER contributes to the establishment, promotion, and development of certain techniques and assists technical services when so requested.

The School's emphasis is on applied research. It also seeks to promote so-called "intermediary" or "synthesis" technologies which, half-way between modern sophisticated technology and the limited technique of the rural environment, provide a real chance of improvement for the greatest number. This is no indictment of very elaborate modern techniques, whose value cannot be minimized, but it is preferable to limit

their use to those areas ready to adapt them and to situations where they are irreplaceable. Thus, the School contributes not only to advanced techniques such as localized irrigation and the use of solar energy, but also to the study of manual pumps and of local building materials.

TRAINING ENGINEERS

EIER's goal is to train engineers capable of taking responsibility for all the development problems of the rural environment. To develop the rural area implies first a good knowledge of the natural physical and human environment in order to reshape it by introducing diverse techniques, from the installation of water points and the organization of construction to the setting up of the necessary hydraulic or communications infrastructure for the marketing of local products. This is why the curriculum provides for numerous projects and study cases which enable the students, while still attending the School, to tackle the concrete application of the acquired techniques.

Consideration is also given to the fact that students may be called upon to occupy senior decision-making positions in their various national services and so must have some familiarity with economics.

The training at EIER is therefore so devised as to enable graduating engineers to comprehend, formulate, and staff various technical projects, as well as to plan and implement these at the national level.

Teaching and research are grouped in five departments: mathematics; hydraulics – sanitary engineering; civil engineering – public works and buildings; energy and refrigeration engineering; and economics and production.

(*a*) *Mathematics department.* The mathematics department provides training in the mathematical computation of engineering problems, in estimate studies and in the formulation of mathematical models.

(*b*) *Hydraulics – sanitary engineering department.* Hydraulics, both general and applied, take up a large part of the curriculum and a hydraulics laboratory is available for the students. Sanitary engineering has the following essential functions:

— to provide users with clean water;
— to dispose of waste waters in a sanitary manner; and
— to contribute to environmental health by improving housing, nutrition, hygiene, etc.

A sanitary engineering laboratory is being installed with the help of WHO. The hydraulics – sanitary engineering department also conducts research on:

— the physicochemical and biological study of the water supply of Oaugadougou; and
— agricultural hydraulics—especially the devising of modern techniques of irrigation.

(*c*) *Civil engineering – public works and building department.* Topographical and geotechnical studies, which are the basis of civil engineering, are carried out by this department. Special attention is given to earth dams; metal constructions and dwellings are also studied. In the soil mechanics laboratory, the future engineer is initiated in field tests used on earthwork sites. Applied research, closely related to the subjects taught, is conducted within the department. The following themes are studied:

— exploitation of possibilities for the development and stabilization of terrain; and
— construction of small earth dams and study of existing dams.

(*d*) *Energy and refrigeration engineering department.* Since its establishment, EIER has paid particular attention to developing training in this field, hitherto nonexistent in the area. A laboratory has been installed and the teaching organized with the collaboration of the Institut français du Froid industriel. The department gives theoretical and practical training in refrigeration and air conditioning, and courses in electrotechnology and heat production. The uses of solar energy by means of an experimental solar pump are also under study, and a technical follow-up is maintained on two solar pumps previously installed in Upper Volta. The goal of current research is to place at the disposal of the rural environment a source of cheap energy for pumping and for the production of electricity and refrigeration.

(*e*) *Economics and production department.* Training in economics, complemented by courses in agriculture, stock breeding, and food production and processing, is provided by this department.

The relative importance of each department is indicated in Fig. 1.

The teaching/learning process

The teaching process takes the form of lecture courses, tutorials, practical work, projects and study trips.

Lectures. The students are usually given, in advance, a mimeographed copy of the content of a course so that they can prepare it beforehand if they wish, and also have at hand notes adapted to their particular needs. Thanks to this method, the teacher has more time for class discussion.

Tutorials and practicals. Tutorials and practicals are periods of applied work during which abstract notions take on a practical meaning. They

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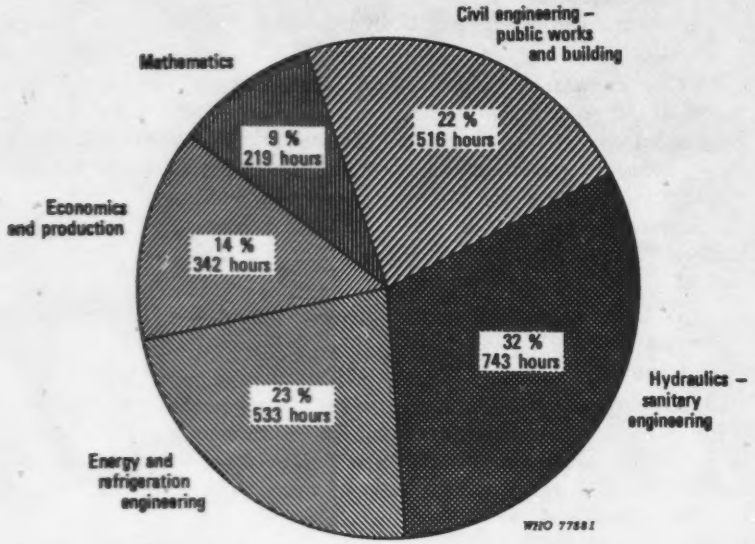
FIG. 1. TEACHING DISTRIBUTION, BY DEPARTMENT



give students the opportunity of judging for themselves their assimilation of the subject matter.

Projects. It is considered necessary to give students an education which will enable them to carry out practical functions on graduation. This is accomplished by requiring them to work on numerous projects and study cases. The particulars of a real problem, most often one that is being investigated or acted upon in Upper Volta, are given to the students, who must make a study of it, devise plans for execution, give estimates, etc.

Study trips. The equivalent of five weeks of schooling is set aside for study trips. These visits are distributed throughout the period of studies, but the most important trip (lasting two weeks) takes place shortly before graduation. In relation to this final trip, EIER has made an experiment which deserves special mention.

At the beginning, the country visited was always a European one—for many reasons. From the technical point of view, it is certainly easier, during a short trip, to see in Europe many interesting technical developments within a reasonable distance. To this must be added the desire to give the students an opportunity to measure themselves against their

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European colleagues so as to realize their own worth and also have an appreciation of their own capabilities. This psychological factor had an even greater justification during the first years of the school, when no former student could testify as to the quality of its training, and when studies in Europe exercised—as they still do—a strong attraction for many African students. In 1975, a break was made with this four-year-old tradition and the end-of-studies trip of the final-year students took place in Senegal and Morocco. The experience proved most positive for the following reasons: although technologically less advanced, such countries present enough interesting examples readily applicable to other African countries and provide opportunities for raising major issues. An example of one such issue is the question of whether it is useful, in Africa, to install an entirely automatically controlled system of irrigation. This type of system is used in Europe but not in Senegal or Morocco. In a case like this, automation may represent an unrealistic goal for the near future; hence a visit to Europe might be more discouraging than stimulating, whereas visits to countries technologically similar to the student's own and observation of the success with which problems of development have been tackled in such countries are most encouraging.

The following are a few other teaching methods which have been used during the years.

Student participation in research work. Within the schedule of the last year of study a relatively long period (the equivalent of five or six weeks of work) used to be allowed for engineering students to participate in the research conducted at the school. Each group of two students chose from a list proposed by the various professors the subject of a short study within the general frame of current research. The two students were required, with the help of the responsible professor, to carry out the study, then write a report and defend it in front of a jury.

This interesting experiment had to be abandoned for various reasons. It was becoming more and more difficult to maintain the time allotted to this work within the programme of studies of the third year. Also, the students had difficulty in acquiring, in a rather short time, a sufficient mastery of their subject to make valid judgements. Besides, five weeks of work are not enough to acquire real independence *vis-à-vis* the professor responsible for the study, who probably remained too influential. Although at present not practised, this experiment seemed valid, and there is no doubt that it will be resumed in the future to define the profile of specialization courses it is intended to undertake.

Surveys. On several occasions students have participated in various surveys initiated by certain national services or by EIER.

Surveys are used as a teaching method in order to accustom students to the fact that a project should only be conceived after they have assessed, with the people concerned, the interest these people have in it, the difficulties it involves, the improvement it can bring about, and the popular participation it might arouse. There is too great a risk of seeing engineers locked up in their studies, elaborating and designing "pilot projects" which, because the human aspects have not been sufficiently taken into consideration, remain purely academic exercises.

Admission of students

EIER usually admits students upon presentation of a file attesting to the possession of a university degree in general sciences or its equivalent. Admission on the basis of an entrance examination accounts for only a minority of the students enrolled. As all universities do not have the same training objectives or selection criteria, there is a great disparity in the level of candidates and the School is faced with the problem of trying to achieve homogeneity in this respect.

REVIEW OF THE PROGRAMME

Various difficulties have been encountered at the training level at EIER. The training profile defined for rural engineers is a vast one. Because EIER aims to train engineers competent in a variety of fields, the curriculum is very heavy. A doubt has been raised whether the students assimilate the various disciplines or whether they become a jack of all trades and master of none.

An answer has been and is being sought to this disquieting question in as precise as possible an evaluation of the services rendered by former students, by means of an ongoing survey among them. Though some of the EIER engineers have been very favourably noticed because of their competence and knowledge, the inquiry is not pointless. Because of lack of time for in-depth thinking, some students have difficulty in feeling at ease when dealing with certain fundamental matters.

In view of this situation, a choice will have to be made between either requiring higher entrance qualifications, or modifying the curriculum so as to add, for example, another year of study to give the students an opportunity to become better acquainted with the various subjects, or instituting a system of electives which would allow students to choose options according to their task or the needs of their countries. The choice of one of these solutions will depend on the result of the current inquiry.

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A second difficulty is that of overcoming a mistaken conception of an engineer's functions that some would-be engineers seem to harbour. It is not pointless to remind students that the engineer is at the service of his fellow beings and, in the case of the EIER-trained engineer, at the service of the rural world, and that the status of his position is incidental. Some students regard themselves as the chosen sons of their country and hence only envisage the possibility of living in comfort, i.e., in a town, preferably the capital city. They forget that true competence can be acquired only after assessing, in the field, the existing problems and finding a way to solve them. They must learn to endure hardship and not feel that living without comfort is below their dignity; that air travel is no more gratifying than other means of transport. If the School takes the trouble of stating these truisms, it is because an immoderate taste for status seems to exist among those liable to occupy important positions, as well as a serious propensity not to distinguish respectability from appearance, or position from its trappings.

There is an obstacle of a different order which must be mentioned and that is the lack of opportunity for real relaxation for future engineers. This is a problem students often encounter. It arises from the difficulty of social interaction of students with the community. Admired, fawned upon, but sometimes feared and rejected as belonging to a minority likely to question the establishment, students also have the handicap of not possessing a reassuring status: most often unmarried and outside the family circle, they have to rely on each other for company. This ghetto-like situation is not conducive to self-realization but is no fault of the students.

Under these circumstances, it is necessary, for the psychological well-being of the students, to organize the limited space available for leisure activities. A place where they can meet in a congenial atmosphere and equipment for a variety of games and sports placed at their disposal are not luxuries but meet a real need. The number of foreign students at EIER renders this need even more acute. At present, EIER is under-equipped for leisure pursuits owing to lack of funds.

PERSONAL OBSERVATIONS

The standard of education of the students admitted to the school should be more homogeneous. The method to be used to arrive at this result remains to be determined but perhaps there should be an entrance examination for all.

Taking into account the results of the ongoing survey undertaken among former students, there should be a redefinition of the profile of

the rural engineer and, eventually, a revision of the curriculum, possibly with the introduction of electives or a required or optional additional academic year.

On the physical level, there is a painful lack of facilities for leisure activities.

These are the weaknesses revealed by critical analysis. Only by being objective about problems can improvements be made. A great attachment exists towards EIER because of its special nature. Its history, though short, is already interesting, and a remarkable collaboration is evident among its component bodies: administrative board, directors and staff, students and former students.

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